STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION

DIVISION OF WATER POLLUTION CONTROL
401 CHURCH STREET
L & C ANNEX 6TH FLOOR
NASHVILLE TN 37243

October 11, 2010

Ms. Linden (Lindy) P. Johnson
Manager - Water Permitting & Compliance
TVA - Environmental Affairs
1101 Market St., LP 5D
Chattanooga, TN 37402

Subject: **Draft of NPDES Permit No. TN0005452**
TVA - Kingston Fossil Plant (KIF)
Harriman, Roane County, Tennessee

Dear Ms. Johnson:

Enclosed please find a draft copy of the NPDES permit which the Division of Water Pollution Control (the division) proposes to issue. This draft copy is furnished to you solely for your review of its provisions. This permit authorizes no wastewater discharges. The issuance of an official permit is contingent upon your meeting all of the requirements of the Tennessee Water Quality Control Act and the Rules and Regulations of the Tennessee Water Quality Control Board.

Also enclosed is a copy of the public notice that announces our intent to issue this permit. The notice affords the public an opportunity to review the draft permit and, if necessary, request a public hearing on this issuance process. If you disagree with the provisions and requirements contained in the draft permit, you have twenty-five (25) days from the date of this correspondence to notify the division of your objections. If your objections cannot be resolved, you may appeal this permit upon issuance. This appeal should be filed in accordance with Section 69-3-110 of the Tennessee Code Annotated.

If you have questions, please contact the division at the Knoxville Environmental Field Office at 1-888-891-TDEC; or, at this office, please contact Mr. Bob Alexander at (615) 532-0659 or by E-mail at *Robert.Alexander@tn.gov*.

Sincerely,

Vojin Janjić
Manager, Permit Section
Division of Water Pollution Control

P/WAT-3
Enclosure

cc: DWPC, Permit Section & Knoxville Environmental Field Office
Mr. Woody L Smith, Env Pro Specialist 4, TDEC-WPC, Woody.Smith@tn.gov
Ms. Leslie Nale, Plant Manager, lwnale@tva.gov
Ms. Connie A. Kagey, NPDES Permit Section, EPA Region IV, Kagey.Connie@epamail.epa.gov

STATE OF TENNESSEE

NPDES PERMIT

No. TN0005452

Authorization to discharge under the
National Pollutant Discharge Elimination System (NPDES)

Issued By
Tennessee Department of Environment and Conservation
Division of Water Pollution Control
401 Church Street
6th Floor, L & C Annex
Nashville, Tennessee 37243-1534

Under authority of the Tennessee Water Quality Control Act of 1977 (T.C.A. 69-3-101 et seq.) and the delegation of authority from the United States Environmental Protection Agency under the Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977 (33 U.S.C. 1251, et seq.)

Discharger: **TVA - Kingston Fossil Plant**

is authorized to discharge: fly ash and bottom ash sluice water, storm water runoff, fire protection flushes and groundwater, coal yard runoff pond discharges including utility building drainage, coal pile and coal conveyor drainage, red water wetlands discharges, precipitator area washdown and roof drains, station sump discharges including boiler leakage, laboratory and analytical process water, boiler blowdown, miscellaneous equipment cooling and lubricating water, floor washing wastes, air conditioning cooling water, ID fan cooling water, ash system leakage and boiler bottom overflow, water treatment plant wastes, ammonia storage runoff, treated chemical and nonchemical metal cleaning wastes from Internal Monitoring Point 005 and nonchemical metal cleaning wastes from **Outfall 001**; treated FGD wastewater from Outrall 02A and once through condenser cooling water, storm water runoff, groundwater, raw water leakage and fire protection flushes, intake screen backwash, and boiler blowdown, from **Outfall 002**; storm water runoff, fire protection flushes, raw water leakage and noncontact cooling water from **Outfall 006**; storm water runoff and abandoned ash pond seepage from **Outfall 007**; drainage from sluice line trench from **Outfall 008**

from a facility located: **in Harriman, Roane County, Tennessee**

to receiving waters named: **Clinch River at mile 2.9**

in accordance with effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective on:

This permit shall expire on:

Issuance date: DRAFT

Draft

Paul E. Davis, Director
Division of Water Pollution Control

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TN0005452.DOC

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

TVA - Kingston Fossil Plant is authorized to discharge fly ash and bottom ash sluice water, storm water runoff, fire protection flushes and groundwater, coal yard runoff pond discharges including utility building drainage, coal pile and coal conveyor drainage, red water wetlands discharges, precipitator area washdown and roof drains, station sump discharges including boiler leakage, laboratory and analytical process water, boiler blowdown, miscellaneous equipment cooling and lubricating water, floor washing wastes, air conditioning cooling water, ID fan cooling water, ash system leakage and boiler bottom overflow, water treatment plant wastes, ammonia storage runoff, treated chemical and nonchemical metal cleaning wastes from Internal Monitoring Point 005 and nonchemical metal cleaning wastes from **Outfall 001**; once through condenser cooling water, storm water runoff, groundwater, raw water leakage and fire protection flushes, intake screen backwash, and boiler blowdown, from **Outfall 002**; storm water runoff, fire protection flushes, raw water leakage and noncontact cooling water from **Outfall 006**; storm water runoff and abandoned ash pond seepage from **Outfall 007**; drainage from sluice line trench from **Outfall 008** to Clinch River at mile 2.9.

Outfall 001 (fly ash and bottom ash sluice water, storm water runoff, fire protection flushes and groundwater, coal yard runoff pond discharges including utility building drainage, coal pile and coal conveyor drainage, red water wetlands discharges, precipitator area washdown and roof drains, station sump discharges including boiler leakage, laboratory and analytical process water, boiler blowdown, miscellaneous equipment cooling and lubricating water, floor washing wastes, air conditioning cooling water, ID fan cooling water, ash system leakage and boiler bottom overflow, water treatment plant wastes, ammonia storage runoff, treated chemical and nonchemical metal cleaning wastes from Internal Monitoring Point 005 and nonchemical metal cleaning wastes) shall be limited and monitored by the permittee as specified below:

PERMIT LIMITS

OUTFALL 001

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY			
	AVG. CONC. (mg/l)	AVG. AMNT (lb/day)	MAX. CONC. (mg/l)	MAX. AMNT (lb/day)	MSRMNT. FRQNCY.	SAMPLE TYPE
FLOW	Report (MGD) [1]		Report (MGD) [1]		1/Week	Instantaneous
pH [2]	Range 6.0 - 9.0				1/Week	Grab
OIL & GREASE	14.4	--	19.4	--	1/Month	Grab
TOTAL SUSPENDED SOLIDS (TSS)	29.9	--	92.0	--	1/Month	Grab
NITROGEN, AMMONIA TOTAL (Plant Intake)	--	--	Report	Report	1/Month	Grab
NITROGEN, AMMONIA TOTAL (Effluent)	--	--	Report	Report	1/Month	Grab
NITROGEN, AMMONIA TOTAL (Net Discharge)	--	--	Report [4]	Report	1/Month	Calculated
ALUMINUM, TOTAL	--	--	Report	--	1/Month	Grab
ANTIMONY, TOTAL	--	--	Report	--	1/Month	Grab
ARSENIC, TOTAL	--	--	Report	--	1/Month	Grab
BARIUM, TOTAL	--	--	Report	--	1/Month	Grab
BERYLLIUM, TOTAL	--	--	Report	--	1/Month	Grab
CADMIUM, TOTAL	--	--	Report	--	1/Month	Grab
CHROMIUM, TOTAL	--	--	Report	--	1/Month	Grab
COPPER,TOTAL	--	--	Report	--	1/Month	Grab
IRON,TOTAL	--	--	Report	--	1/Month	Grab
LEAD, TOTAL	--	--	Report	--	1/Month	Grab
MERCURY, TOTAL	--	--	Report	--	1/Month	Grab
Methyl MERCURY [5]	--	--	Report	--	Quarterly	Grab
NICKEL, TOTAL	--	--	Report	--	1/Month	Grab
SELENIUM, TOTAL	--	--	Report	--	1/Month	Grab
SILVER, TOTAL	--	--	Report	--	1/Month	Grab
THALLIUM, TOTAL	--	--	Report	--	1/Month	Grab
ZINC, TOTAL	--	--	Report	--	1/Month	Grab
CYANIDE, TOTAL	--	--	Report	--	1/Month	Grab
IC25	Report (serial dilutions)				Once/permit	Grab [3]

Note: The permittee shall take reasonable steps to prevent discharge of cenospheres other than in trace amounts from the outfall.

1 Flow shall be reported in Million Gallons per Day (MGD).

2 pH analyses shall be performed within fifteen (15) minutes of sample collection.

3 See Part III for methodology.

4 If a calculated value for net addition of ammonia as nitrogen exceeds an action concentration value of 1.5 mg/L, the permittee should investigate source(s) of ammonia, and proceed with a corrective action(s), if necessary. Furthermore, Knoxville EFO shall be notified within 24 hours from the time the permittee receives results indicating that an action value of 1.0 mg/L was exceeded

5 Methyl Mercury will be reported along with total mercury for one year, with a re-evaluation of future monitoring frequency.

TVA - Kingston Fossil Plant is authorized to discharge once through condenser cooling water, storm water runoff, groundwater, raw water leakage and fire protection flushes, intake screen backwash, and boiler blowdown from **Outfall 002** to mile 2.9 of the Clinch River. Outfall 002 is established to assess cooling water discharges. Outfall 002 also contains Flue Gas Desulfurization System (flue gas wet scrubber) effluent from the FGD retention pond into the KIF discharge channel , which is addressed as Internal Monitoring Point 02A below.

Outfall 002 shall be limited and monitored by the permittee as specified below:

PERMIT LIMITS

OUTFALL 002

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY			
	AVG. CONC. (mg/l)	AVG. AMNT. (lb/day)	MAX. CONC. (mg/l)	MAX. AMNT. (lb/day)	MSRMNT. FRQNCY.	SAMPLE TYPE
FLOW	Report (MGD) [1]		Report (MGD) [1]		Daily	Pump logs
pH [2]	Range 6.0 to 9.0				1/Week	Grab
TEMPERATURE, Intake	--		Report		Continuous [3]	Recorder
TEMPERATURE, Effluent	--		36.1°C (97.0°F)		Daily	Calculate [3]
TOTAL RESIDUAL OXIDANT (reported as chlorine) [4]	0.038	--	0.066	--	1/Week	Grab [6]
TOTAL RESIDUAL OXIDANT (reported as chlorine) [5]	0.011	--	0.019	--	1/Week	Grab [6]
TIME OF OXIDANT ADDITION (minutes/day/unit)	--		120 [7]		1/Day	Log Records
IC25	Survival, Reproduction, & Growth in 100% Effluent				See note 8	Composite [8]

1 Flow shall be reported in Million Gallons per Day (MGD).
2 pH analyses shall be performed within fifteen (15) minutes of sample collection.
3 Intake temperature is measured hourly (continuously) but reported as a daily average once per day. The daily average discharge temperature shall be calculated for the cooling channel based on the 24-hour average intake temperature, 24-hour average unit load, and the 24-hour average flow through Outfall 002.
4 The limits depicted are applicable at flows of 654 MGD, and above, from Outfall 002. Only one (1) unit, with a flow rate of 187 MGD is allowed to be chlorinated at one time.
5 The limits depicted are applicable at flows less than 654 MGD, in lieu of the limits shown in footnote 4.
6 Flow weighted maximum shall be calculated from instantaneous measurements of the chlorinated discharges from a unit and adjusted for flow from the non-chlorinated units contributing to the discharge. The calculated flow-weighted maximum will be used for determination of compliance with the daily maximum limitation. Except for periods of macroinvertebrate control when oxidant addition is required (see Permit - Part III), samples shall be taken once at the beginning of the period of chlorination for one unit and once every 15 minutes thereafter. At the end of the period of chlorination for that unit, one sample shall be taken. Sampling for these oxidants is not required when there is no chlorine/bromine added during that day. TRC analyses shall be performed within fifteen (15) minutes of sample collection.
7 Application of a oxidant (bromine/chlorine) beyond the 120 minutes per day will be allowed to facilitate nuisance macroinvertebrate control according to the Plan for such activities described in Permit - Part III.
8 See Part III for sampling requirements and monitoring frequency of toxicity tests.

Outfalls 006, 007, and 008 convey comparatively minor waste streams: storm water runoff, fire protection flushes, raw water leakage and noncontact cooling water from **Outfall 006**; storm water runoff and abandoned ash pond seepage from **Outfall 007**; drainage from sluice line trench from **Outfall 008**. All three outfalls are discharging into the facility's intake channel which ultimately discharges via Outfall 002. The combined flow from all three discharges is 0.588 MGD, which constitutes approximately 0.045% of the total flow used for cooling and other purposes at the facility. Consequently, there will be no numeric effluent limitations or specific monitoring requirements established for discharges from Outfalls 006, 007 and 008.

Internal Monitoring Point 02A [formerly identified in NPDES Permit TN0080870 as Outfall 01A] discharges FGD wet scrubber effluent from the FGD retention pond into the KIF discharge channel, also called Outfall 002 to the Clinch River at mile 2.5. Compliance with Internal Monitoring Point 02A limits will be measured separately from Outfall 002.

PERMIT LIMITS

OUTFALL 02A

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY			
	AVG. CONC. (mg/l)	AVG. AMNT. (lb/day)	MAX. CONC. (mg/l)	MAX. AMNT. (lb/day)	MSRMNT. FRQNCY.	SAMPLE TYPE***
FLOW	Report (MGD) *		Report (MGD) *		1/Week	Calculated
pH**	Range 6.0 - 9.0				1/Week	Grab
TOTAL SUSPENDED SOLIDS (TSS)	30	--	100	--	1/Week	Grab
OIL & GREASE	15	--	20	--	1/Week	Grab
TOTAL MERCURY	Report	--	Report	--	Quarterly	Grab
METHYL MERCURY	Report	--	Report	--	Quarterly	Grab
ARSENIC	Report	--	Report	--	Monthly	Grab
CADMIUM	Report	--	Report	--	Monthly	Grab
COPPER	Report	--	Report	--	Monthly	Grab
LEAD	Report	--	Report	--	Monthly	Grab
NICKEL	Report	--	Report	--	Monthly	Grab
SELENIUM	Report	--	Report	--	Monthly	Grab
THALLIUM	Report	--	Report	--	Monthly	Grab
ZINC	Report	--	Report	--	Monthly	Grab

* Flow shall be reported in Million Gallons per Day (MGD).
** pH analyses shall be performed within fifteen (15) minutes of sample collection.
*** Grab samples will be used at the time of pumped discharge from the detention pond.

Internal Monitoring Point 02A Updated Permit Application:

As established in NPDES Permit TN00080870, and with the submission of estimated data on the permit application, the permittee must, within two years after beginning to discharge from the proposed facility, complete and submit Items V and VI of NPDES application Form 2C (EPA Form 3510-2C). It is not necessary to complete those portions of Item V requiring tests

which are already performed under the discharge monitoring requirements of NPDES permit TN0080870.

Additional monitoring requirements:

Additional monitoring requirements and conditions applicable to all outfalls include:

a. There shall be no distinctly visible floating scum, oil sheen, or other matter contained in the wastewater discharge. **The wastewater discharge shall not cause an objectionable color contrast in the receiving stream.** The discharge activity shall not cause or contribute to violations of water quality criteria as stated in the TDEC Rules, Chapter 1200-4-3-.03

b. The wastewater discharge shall not contain pollutants in quantities that will be hazardous or otherwise detrimental to humans, livestock, wildlife, plant life, or fish and aquatic life in the receiving stream. Under no circumstances may discharges exceed numeric water quality criteria for aquatic and human life as stated in State of Tennessee Rule 1200-4-3.

c. Sludge or any other material removed by any treatment works must be disposed of in a manner, which prevents its entrance into or pollution of any surface or subsurface waters. Additionally, the disposal of such sludge or other material must be in compliance with the Tennessee Solid Waste Disposal Act, TCA 68-31-101 et seq. and the Tennessee Hazardous Waste Management Act, TCA 68-46-101 et seq.

d. There shall be no discharge of polychlorinated biphenyl compounds (PCB). With regard to PCB sampling, the permittee will have the opportunity to conduct additional tests, as necessary, to establish the existence of any PCBs in the effluent if they exist. The results of these additional tests and any conclusions drawn must be submitted to the division within fifteen (15) days along with the monthly discharge monitoring report. The division shall maintain the exclusive determination of the validity of the additional tests and any conclusions to be drawn from them regarding the possibility of matrix interferences, or the need for additional monitoring. The decision of the division in this matter shall be final.

e. The final permit retains weekly monitoring of biocides per analyses for Total Residual Oxidants during those times of year when biocides are required. Total residual oxidants for cooling water treated with bromides means the value obtained using the amperometric method for total residual chlorine described in 40 CFR part 136. Further, the final permit requires submission of the ***Biocide/Corrosion Treatment Plan (B/CTP)*** with division approval in advance of future changes in biocide use

B. MONITORING PROCEDURES

1. Representative Sampling

Samples and measurements taken in compliance with the monitoring requirements specified herein shall be representative of the volume and nature of the monitored discharge, and shall be taken after treatment and prior to mixing with uncontaminated storm water runoff or the receiving stream.

For Outfall 001, monitoring of the ash pond effluent shall be conducted after treatment, and prior to mixing with uncontaminated storm water runoff or the intake channel.

For Outfall 002, monitoring shall be conducted as follows:

- To demonstrate compliance with the Total Residual Oxidant, samples shall be taken after discharge from each of the cooling units and compliance with the limitations shall be calculated based on dilution, if any, from other untreated flows discharging through Outfall 002.

- To demonstrate compliance with the Intake Temperature monitoring requirements, samples shall be taken at the plant intake.

- To demonstrate compliance with the Discharge Temperature monitoring requirements, samples shall be calculated for the combined cooling water effluent prior to discharge or mixing with the receiving stream.
- To demonstrate compliance with the pH and toxicity limitations, samples shall be taken at the barge mooring cell downstream on the left bank of the discharge channel.

2. Sampling Frequency

Monitoring frequency for total mercury will be monthly for twelve months on a grab sample. Monitoring for methyl mercury will be performed quarterly on a grab sample. Monitoring will continue for one (1) year at which time the frequency of mercury monitoring will be reevaluated.

If there is a discharge from a permitted outfall on any given day during the monitoring period, the permittee must sample and report the results of analyses accordingly, and the permittee should not mark the 'No Discharge' box on the Discharge Monitoring Report form.

3. Test Procedures

a. Test procedures for the analysis of pollutants shall conform to regulations published pursuant to Section 304 (h) of the Clean Water Act (the "Act"), as amended, under which such procedures may be required. Analyses of total mercury will use either EPA Method 245.7 or Method 1631. Analyses for methyl mercury will use EPA Method 1630.

b. Unless otherwise noted in the permit, all pollutant parameters shall be determined according to methods prescribed in Title 40, CFR Part 136, as amended, promulgated pursuant to Section 304 (h) of the Act.

c. In instances where permit limits established through implementation of applicable water criteria are below analytical capabilities, compliance with those limits will be determined using the detection limits described in the TN Rules, Chapter 1200-4-3-.05(8)

4. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

a. The exact place, date and time of sampling;

b. The exact person(s) collecting samples;

c. The dates and times the analyses were performed;

d. The person(s) or laboratory who performed the analyses;

e. The analytical techniques or methods used, and;

f. The results of all required analyses.

5. Records Retention

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed and calibration and maintenance of instrumentation shall be retained for a minimum of three (3) years, or longer, if requested by the Division of Water Pollution Control.

C. REPORTING

1. Monitoring Results

Monitoring results for all facility Outfalls and Internal Monitoring Points shall be recorded monthly and submitted monthly using Discharge Monitoring Report (DMR) Forms supplied by the Division of Water Pollution Control or comparable forms supplied by the permittee. The top two copies of each report are to be submitted. A copy should be retained for the permittee's files.

Submittals of paper reports shall be made or postmarked no later than 15 days after the completion of the reporting period. Submittals made on computerized media may be submitted by the last working day of the month after the reporting period. Discharge Monitoring Reports or other communications regarding data submissions or compliance with the terms of the permit shall be sent to:

TENNESSEE DEPT. OF ENVIRONMENT & CONSERVATION
DIVISION OF WATER POLLUTION CONTROL
COMPLIANCE REVIEW SECTION
401 CHURCH STREET
L & C ANNEX 6TH FLOOR

NASHVILLE TN 37243-1534

The first DMR is due on the fifteenth of the month following permit effectiveness.

DMRs and any other information or report must be signed and certified by a responsible corporate officer as defined in 40 CFR 122.22, a general partner or proprietor, or a principal municipal executive officer or ranking elected official, or his duly authorized representative. Such authorization must be submitted in writing and must explain the duties and responsibilities of the authorized representative.

The electronic submission of DMRs will be accepted only if approved in writing by the division. For purposes of determining compliance with this permit, data submitted in electronic format will carry the same weight as data submitted on signed and certified DMR forms.

2. Additional Monitoring by Permittee

If the permittee monitors any pollutant specifically limited by this permit more frequently than required at the location(s) designated, using approved analytical methods as specified herein, the results of such monitoring shall be included in the calculation and reporting of the values required in the DMR form. Such increased frequency shall also be indicated on the form.

3. Falsifying Results and/or Reports

Knowingly making any false statement on any report required by this permit or falsifying any result may result in the imposition of criminal penalties as provided for in Section 309 of the Federal Water Pollution Control Act, as amended, and in Section 69-3-115 of the Tennessee Water Quality Control Act.

E. SCHEDULE OF COMPLIANCE

Full compliance and operational levels shall be attained from the effective date of this permit.

PART II

A. GENERAL PROVISIONS

1. Duty to Reapply

Permittee is not authorized to discharge after the expiration date of this permit. In order to receive authorization to discharge beyond the expiration date, the permittee shall submit such information and forms as are required to the Director of Water Pollution Control (the "Director") no later than 180 days prior to the expiration date. Such applications must be properly signed and certified.

2. Right of Entry

The permittee shall allow the Director, the Regional Administrator of the U.S. Environmental Protection Agency, or their authorized representatives, upon the presentation of credentials:

a. To enter upon the permittee's premises where an effluent source is located or where records are required to be kept under the terms and conditions of this permit, and at reasonable times to copy these records;

b. To inspect at reasonable times any monitoring equipment or method or any collection, treatment, pollution management, or discharge facilities required under this permit; and

c. To sample at reasonable times any discharge of pollutants.

3. Availability of Reports

Except for data determined to be confidential under Section 308 of the Federal Water Pollution Control Act, as amended, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Division of Water Pollution Control. As required by the Federal Act, effluent data shall not be considered confidential.

4. Proper Operation and Maintenance

a. The permittee shall at all times properly operate and maintain all facilities and systems (and related appurtenances) for collection and treatment which are installed or used by the permittee to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also includes adequate laboratory and process controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit. Backup continuous pH and flow monitoring equipment are not required.

b. Dilution water shall not be added to comply with effluent requirements to achieve BCT, BPT, BAT and or other technology-based effluent limitations such as those in State of Tennessee Rule 1200-4-5-.03.

5. Treatment Facility Failure

The permittee, in order to maintain compliance with this permit, shall control production, all discharges, or both, upon reduction, loss, or failure of the treatment facility, until the facility is restored or an alternative method of treatment is provided. This requirement applies in such situations as the reduction, loss, or failure of the primary source of power.

6. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State, or local laws or regulations.

7. Severability

The provisions of this permit are severable. If any provision of this permit due to any circumstance, is held invalid, then the application of such provision to other circumstances and to the remainder of this permit shall not be affected thereby.

8. Other Information

If the permittee becomes aware that he failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Director, then he shall promptly submit such facts or information.

B. CHANGES AFFECTING THE PERMIT

1. Planned Changes

The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

a. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b); or

b. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR 122.42(a)(1).

2. Permit Modification, Revocation, or Termination

a. This permit may be modified, revoked and reissued, or terminated for cause as described in 40 CFR 122.62 and 122.64, Federal Register, Volume 49, No. 188 (Wednesday, September 26, 1984), as amended.

b. The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

c. If any applicable effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established for any toxic pollutant under Section 307(a) of the Federal Water Pollution Control Act, as amended, the Director shall modify or revoke and reissue the permit to conform to the prohibition or to the effluent standard, providing that the effluent standard is more stringent than the limitation in the permit on the toxic pollutant. The permittee shall comply with these effluent standards or prohibitions within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified or revoked and reissued to incorporate the requirement.

d. The filing of a request by the permittee for a modification, revocation, reissuance, termination, or notification of planned changes or anticipated noncompliance does not halt any permit condition.

3. Change of Ownership

This permit may be transferred to another party (provided there are neither modifications to the facility or it's operations, nor any other changes which might affect the permit limits and conditions contained in the permit) by the permittee if:

a. The permittee notifies the Director of the proposed transfer at least 30 days in advance of the proposed transfer date;

b. The notice includes a written agreement between the existing and new permittees containing a specified date for transfer of permit responsibility, coverage, and liability between them; and

c. The Director, within 30 days, does not notify the current permittee and the new permittee of his intent to modify, revoke or reissue, or terminate the permit and to require that a new application be filed rather than agreeing to the transfer of the permit.

Pursuant to the requirements of 40 CFR 122.61, concerning transfer of ownership, the permittee must provide the following information to the division in their formal notice of intent to transfer ownership: 1) the NPDES permit number of the subject permit; 2) the effective date of the proposed transfer; 3) the name and address of the transferor; 4) the name and address of the transferee; 5) the names of the responsible parties for both the transferor and transferee; 6) a statement that the transferee assumes responsibility for the subject NPDES permit; 7) a statement that the transferor relinquishes responsibility for the subject NPDES permit; 8) the signatures of the responsible parties for both the transferor and transferee pursuant to the requirements of 40 CFR 122.22(a), "Signatories to permit applications"; and, 9) a statement regarding any proposed modifications to the facility, it's operations, or any other changes which might affect the permit limits and conditions contained in the permit.

4. Change of Mailing Address

The permittee shall promptly provide to the Director written notice of any change of mailing address. In the absence of such notice the original address of the permittee will be assumed to be correct.

C. NONCOMPLIANCE

1. Effect of Noncompliance

All discharges shall be consistent with the terms and conditions of this permit. Any permit noncompliance constitutes a violation of applicable State and Federal laws and is grounds for enforcement action, permit termination, permit modification, or denial of permit reissuance.

2. Reporting of Noncompliance

a. 24-Hour Reporting

In the case of any noncompliance which could cause a threat to public drinking supplies, or any other discharge which could constitute a threat to human health or the environment, the required notice of non-compliance shall be provided to the division of Water Pollution Control in the appropriate Environmental Assistance Center within 24-hours from the time the permittee becomes aware of the circumstances. (The Environmental Assistance Center should be contacted for names and phone numbers of environmental response personnel).

A written submission must be provided within five days of the time the permittee becomes aware of the circumstances unless this requirement is waived by the Director on a case-by-case basis. The permittee shall provide the Director with the following information:

i. A description of the discharge and cause of noncompliance;

ii. The period of noncompliance, including exact dates and times or, if not corrected, the anticipated time the noncompliance is expected to continue; and

iii. The steps being taken to reduce, eliminate, and prevent recurrence of the noncomplying discharge.

b. Scheduled Reporting

For instances of noncompliance which are not reported under subparagraph 2.a. above, the permittee shall report the noncompliance on the Discharge Monitoring Report. The report shall contain all information concerning the steps taken, or planned, to reduce, eliminate, and prevent recurrence of the violation and the anticipated time the violation is expected to continue.

3. Overflow

a. "***Overflow***" means the discharge to land or water of wastes from any portion of the collection, transmission, or treatment system other than through permitted outfalls.

b. Overflows are prohibited.

c. The permittee shall operate the collection system so as to avoid overflows. No new or additional flows shall be added upstream of any point in the collection system, which experiences chronic overflows (greater than 5 events per year) or would otherwise overload any portion of the system.

d. Unless there is specific enforcement action to the contrary, the permittee is relieved of this requirement after: 1) an authorized representative of the Commissioner of the Department of Environment and Conservation has approved an engineering report and construction plans and specifications prepared in accordance with accepted engineering practices for correction of the problem; 2) the correction work is underway; and 3) the cumulative, peak-design, flows potentially added from new connections and line extensions upstream of any chronic bypass point are less than or proportional to the amount of inflow and infiltration removal documented upstream of that point. The inflow and infiltration reduction must be measured by the permittee using practices that are customary in the flow measurement industry and reported in an attachment to a Monthly Operating Report submitted to the local TDEC Environmental Assistance Center. The data measurement period shall be sufficient to account for seasonal rainfall patterns and seasonal groundwater table elevations.

e. In the event that more than five (5) overflows have occurred from a single point in the collection system for reasons that may not warrant the self-imposed moratorium or completion of the actions identified in this paragraph, the permittee may request a meeting with the Division of Water Pollution Control EAC staff to petition for a waiver based on mitigating evidence.

4. Upset

a. "***Upset***" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. An upset shall constitute an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the permittee demonstrates, through properly signed, contemporaneous operating logs, or other relevant evidence that:

i. An upset occurred and that the permittee can identify the cause(s) of the upset;

ii. The permitted facility was at the time being operated in a prudent and workman-like manner and in compliance with proper operation and maintenance procedures;

iii. The permittee submitted information required under "Reporting of Noncompliance" within 24-hours of becoming aware of the upset (if this information is provided orally, a written submission must be provided within five days); and

iv. The permittee complied with any remedial measures required under "Adverse Impact."

5. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact to the waters of Tennessee resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge. It shall not be a defense for the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

6. Bypass

a. "***Bypass***" is the intentional diversion of wastewater away from any portion of a treatment facility. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of an overflow. Severe property damage does not mean economic loss caused by delays in production.

b. Bypasses are prohibited unless the following 3 conditions are met:

i. The bypass is unavoidable to prevent loss of life, personal injury, or severe property damage;

ii. There are not feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment down-time. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment down-time or preventative maintenance;

iii. The permittee submits notice of an unanticipated bypass to the Division of Water Pollution Control in the appropriate environmental assistance center within 24-hours of becoming aware of the bypass (if this information is provided orally, a written submission must be provided within five days). When the need for the bypass is foreseeable, prior notification shall be submitted to the Director, if possible, at least 10 days before the date of the bypass.

c. Bypasses not exceeding limitations are allowed **only** if the bypass is necessary for essential maintenance to assure efficient operation. All other bypasses are prohibited. Allowable bypasses not exceeding limitations are not subject to the reporting requirements of 6.b.iii, above.

7. Washout

A washout is prohibited. If a washout occurs the permittee must report the incident to the Division of Water Pollution Control in the appropriate Environmental Assistance Center within 24-hours by telephone. A written submission must be provided within 5 days. The washout must be noted on the discharge monitoring report. Each day of a washout is a separate violation.

D. LIABILITIES

1. Civil and Criminal Liability

Except as provided in permit conditions for "**Bypassing,**" "**Overflow,**" and "**Upset,**" nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance. Notwithstanding this permit, the permittee shall remain liable for any damages sustained by the State of Tennessee, including but not limited to fish kills and losses of aquatic life and/or wildlife, as a result of the discharge of wastewater to any surface or subsurface waters. Additionally, notwithstanding this Permit, it shall be the responsibility of the permittee to conduct its wastewater treatment and/or discharge activities in a manner such that public or private nuisances or health hazards will not be created.

2. Liability Under State Law

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or the Federal Water Pollution Control Act, as amended.

PART III

OTHER REQUIREMENTS

A. ASH POND CLOSURE PLAN AND CERCLA REMEDIAL ACTION WORK PLAN

The permittee shall submit an Ash Pond Closure Plan describing the steps to be taken to prevent contamination of surface waters from the inactive site. Within 90 days after the permit effective date, the permittee shall provide an estimated schedule and closure actions to be taken for conversion from wet ash to dry ash handling. TVA has submitted a Remedial Action Work Plan (RAWP) under CERCLA for the Kingston Ash Recovery Project. For purposes of this permit, an update to the RAWP will suffice to meet this requirement.

The permittee will provide **quarterly updates on progress toward dry ash conversions and ash pond closure** with the Discharge Monitoring Reports submitted for March, June, September, and December. The report must address, at a minimum, the estimated future date for complete closure and elimination of ash pond discharges as well as updated information on planning, design, and construction milestones for each upcoming quarter.

B. DIKE INSPECTIONS

1. INSPECTION PROCEDURES

a. The Kingston ash and gypsum ponds shall be inspected in accordance with TVA's Reservoir Operations Dam Safety Program criteria and processes. This program is in accordance with the 'Federal Guidelines for Dam Safety' developed by the Federal Emergency Management Agency (FEMA 93). This document directs TVA to perform inspections scheduled on specific intervals and with qualified personnel. The dikes will also be visually inspected daily during operations by site personnel or designee. Impoundments shall be inspected annually by a qualified TVA engineer under the direction of a State-registered professional engineer. Special inspections by qualified personnel shall be done immediately after intense, large or extended rain events (i.e., 10-year storm or equaling or exceeding the design requirements for managing stormwater) or within 24 hours after a significant seismic event approaching or exceeding the design event. The reason for this is to validate structural integrity of the structures following an event that could test the design assumptions.

b. Inspections shall, at a minimum, include observations of dams, dikes and toe areas for erosion, cracks or bulges, subsidence, seepage, wet or soft soil, changes in geometry, the depth and elevation of the impounded water, sediment or slurry, freeboard, changes in vegetation such as overly lush, obstructive vegetation and trees, and any other changes which may indicate a potential compromise to impoundment integrity. The findings of each inspection shall be documented in a written inspection report for both ponds.

2. REMEDIATION MEASURES.

a. Within 24 hours of discovering changes that indicate a potential compromise to the structural integrity of the impoundment(s), the permittee shall begin procedures to remediate the problem. Changes such as significant increases in seepage or seepage carrying sediment may be signs of imminent impoundment failure and should be addressed immediately.

b. Other issues which may have long term impacts on integrity, such as trees growing on the embankment (especially large, dead or tilting trees, with special concern for those at the toes of or within the saturated zones of embankment structures), or vegetation-blocking overflows or spillways, shall be removed according to approved geotechnical engineering practices and instructions.

3. REPORTING AND RECORDKEEPING REQUIREMENTS FOR IMPOUNDMENTS

a. Imminent impoundment failure conditions should be reported immediately to the Roane County Emergency Management Agency, who will report to TEMA and TDEC.

b. Within 5 days of discovering a change in the impoundment that could reasonably be expected to indicate a compromise to the structural integrity of the dike (e.g., significant changes in seeps, boils, bulges, or cracks), the permittee must notify the division in writing describing the findings of the inspection, corrective measures taken, and expected outcomes. Failure to do so will be a violation of this permit.

c. The permittee shall submit an annual report to the division summarizing findings of all monitoring activities, inspections, and remediation measures pertaining to the structural integrity, design, construction, and operation and maintenance of all impoundments.

d. The permittee shall maintain records of all impoundment inspection and maintenance activities, including corrective actions made in response to inspections and all other activities undertaken to repair or maintain the impoundment. All records shall be kept on site and made available to State or Federal inspectors upon request.

e. All pertinent impoundment permits, design, construction, operation, and maintenance information, including but not limited to: plans, geotechnical and structural integrity studies, copies of permits, associated certifications by qualified, State-registered professional engineer, and regulatory approvals, shall be kept on site and made available to State or Federal inspectors upon request.

4. PERMIT RE-OPENER REQUIREMENT

The Director may re-open this permit to incorporate more stringent requirements or any applicable standards pertaining to the operation and maintenance of coal combustion waste impoundments.

C. EMERGENCY RESPONSE PLAN

For purposes of this NPDES permit, TVA Kingston Fossil Plant must develop an Emergency Response Plan which addresses the TDEC Advisory Board Lessons Learned, 2009[1]:

> "a preparedness plan that consider[s] a boundary for potentially affected topographic features based on mud flow and wave propagation to develop requirements for CCW storage that will minimize any life threatening effects due to failure."

D. TOXIC POLLUTANTS

The permittee shall notify the Division of Water Pollution Control as soon as it knows or has reason to believe:

1. That any activity has occurred or will occur which would result in the discharge on a routine or frequent basis, of any toxic substance(s) (listed at 40 CFR 122, Appendix D, Table II and III) which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

a. One hundred micrograms per liter (100 ug/l);

b. Two hundred micrograms per liter (200 ug/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/L) for antimony;

c. Five (5) times the maximum concentration value reported for that pollutant(s) in the permit application in accordance with 122.21(g)(7); or

d. The level established by the Director in accordance with 122.44(f).

2. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

a. Five hundred micrograms per liter (500 ug/l);

b. One milligram per liter (1 mg/L) for antimony;

c. Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 122.21(g)(7); or

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[1] Available at http://tn.gov/environment/kingston/adv_board_report.shtml.

d. The level established by the Director in accordance with 122.44(f).

E. REOPENER CLAUSE

If an applicable standard or limitation is promulgated under Sections 301(b)(2)(C) and (D), 304(B)(2), and 307(a)(2) and that effluent standard or limitation is more stringent than any effluent limitation in the permit or controls a pollutant not limited in the permit, the permit shall be promptly modified or revoked and reissued to conform to that effluent standard or limitation.

F. PLACEMENT OF PUBLIC NOTIFICATION SIGNS

Within sixty (60) days of the effective date of this permit, the permittee shall place and maintain a sign(s) at each outfall and any bypass/overflow point in the collection system. For the purposes of this requirement, any bypass/overflow point that has discharged five (5) or more times in the last year must be so posted. The sign(s) should be clearly visible to the public from the bank and the receiving stream or from the nearest public property/right-of-way, if applicable. The minimum sign size should be two feet by two feet (2' x 2') with one inch (1") letters. The sign should be made of durable material and have a white background with black letters.

The sign(s) are to provide notice to the public as to the nature of the discharge and, in the case of the permitted outfalls, that the discharge is regulated by the Tennessee Department of Environment and Conservation, Division of Water Pollution Control. The following is given as an example of the minimal amount of information that must be included on the sign:

TREATED INDUSTRIAL WASTEWATER, ASH POND DISCHARGES, AND STORMWATER RUNOFF – OUTFALL 001
TVA - Kingston Fossil Plant (KIF)
(Permittee's Phone Number)
NPDES Permit NO. TN0005452
TENNESSEE DIVISION OF WATER POLLUTION CONTROL
1-888-891-8332 ENVIRONMENTAL FIELD OFFICE - Knoxville

CONDENSER COOLING WATER, BOILER BLOWDOWN– OUTFALL 002
TVA - Kingston Fossil Plant (KIF)
(Permittee's Phone Number)
NPDES Permit NO. TN0005452
TENNESSEE DIVISION OF WATER POLLUTION CONTROL
1-888-891-8332 ENVIRONMENTAL FIELD OFFICE - Knoxville

G. ANTIDEGRADATION

Pursuant to the Rules of the Tennessee Department of Environment and Conservation, Chapter 1200-4-3-.06, titled "Tennessee Antidegradation Statement," and in consideration of the Department's directive in attaining the greatest degree of effluent reduction achievable in municipal, industrial, and other wastes, the permittee shall further be required, pursuant to the terms and conditions of this permit, to comply with the effluent limitations and schedules of compliance required to implement applicable water quality standards, to comply with a State Water Quality Plan or other State or Federal laws or regulations, or where practicable, to comply with a standard permitting no discharge of pollutants.

H. BIOMONITORING REQUIREMENTS, CHRONIC – OUTFALL 002

The permittee shall conduct a 3-Brood Ceriodaphnia dubia Survival and Reproduction Test and a 7-Day Fathead Minnow (Pimephales promelas) Larval Survival and Growth Test on the same samples of final effluent from Outfall 002 annually (only when biocides are used). Toxicity tests at Outfall 002 shall commence no later than 90 days from biocide application. If no biocides are added, Outfall 002 discharges consist of raw river water to which no chemicals are added. Future requirements may be added as a Biocide / Chemical Treatment Plan (B/CTP) is developed.

The measured endpoint for toxicity will be the inhibition concentration causing 25% reduction (IC25) in survival, reproduction, or growth of the test organisms. The IC25 shall be determined based on a 25% reduction as compared to the controls. The average reproduction and growth responses will be determined based on the number of *Ceriodaphnia dubia* or *Pimephales promelas* larvae used to initiate the test.

Test shall be conducted and its results reported based on appropriate replicates of a total of five serial dilutions and a control, using the percent effluent dilutions as presented in the following table:

Serial Dilutions for Whole Effluent Toxicity (WET) Testing					
Permit Limit (PL)	**0.50 X PL**	**0.25 X PL**	**0.125 X PL**	**0.0625 X PL**	**Control**
% effluent					
100	**50**	**25**	**12.5**	**6.25**	**0**

The dilution/control water used will be a moderately hard water as described in Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, EPA-821-R-02-013 (or the most current edition). Results from a chronic standard reference toxicant quality assurance test for each species tested shall be submitted with the discharge monitoring report. Reference toxicant tests shall be conducted as required in EPA-821-R-02-013 (or the most current edition). Additionally, the analysis of this multi-concentration test shall include review of the concentration-response relationship to ensure that calculated test results are interpreted appropriately.

When effluent toxicity is demonstrated and ambient samples run concurrently with effluent tests are also shown to be toxic enough to represent a test failure (100 percent samples statistically less than controls using t-tests and minnow growth or daphnid reproduction is 25 less than controls), the test will be repeated and the failed effluent test will not be considered a permit violation. Effluent toxicity demonstrated by the tests specified here in which is not shown to be related toambient conditions constitutes a violation of this permit.

All tests will be conducted using a minimum of three 24-hour flow-proportionate composite samples of final effluent (e.g., collected on days 1, 3 and 5). If, in any control more than 20% of the test organisms die in 7 days, the test (control and effluent) is considered invalid and the test shall be repeated within 30 days of the date the initial test is invalidated. Furthermore, if the results do not meet the acceptability criteria of section 4.9.1, EPA-821-R-02-013 (or the most current edition), or if the required concentration-response review fails to yield a valid relationship per guidance contained in Method Guidance and Recommendations for

Whole Effluent Toxicity (WET) Testing, EPA-821-B-00-004 (or the most current edition), that test shall be repeated. Any test initiated but terminated before completion must also be reported along with a complete explanation for the termination.

Furthermore, if the results do not meet the acceptability criteria as defined in Short-Term Methods for Estimating the Chronic toxicity of Effluents and Receiving Waters to Freshwater Organisms, **EPA-821-R-02-013 (or the most current edition)**, or if the required concentration-response review fails to yield a valid relationship per guidance contained in Method Guidance and Recommendations for Whole effluent toxicity (WET) Testing, EPA-821-B-00-004 (or the most current edition), that test shall be repeated.

In the event of a test failure, the permittee must start a follow-up test within 2 weeks and submit results from a follow-up test within 30 days from obtaining initial WET testing results. The follow-up test must be conducted using the same serial dilutions as presented in the corresponding table(s) above. **The follow-up test will not negate an initial failed test. In addition, the failure of a follow-up test will constitute a separate permit violation which must also be reported.**

In the event of 2 consecutive test failures or 3 test failures within a 12 month period for the same outfall, the permittee must initiate a Toxicity Identification Evaluation/Toxicity Reduction Evaluation (TIE/TRE) study within 30 days and so notify the division by letter. This notification shall include a schedule of activities for the initial investigation of that outfall. **During the term of the TIE/TRE study, the frequency of biomonitoring shall be once every three months.** Additionally, the permittee shall submit progress reports once every three months throughout the term of the TIE/TRE study. The toxicity must be reduced to allowable limits for that outfall within 2 years of initiation of the TIE/TRE study. Subsequent to the results obtained from the TIE/TRE studies, the permittee may request an extension of the TIE/TRE study period if necessary to conduct further analyses. The final determination of any extension period will be made at the discretion of the division.

The TIE/TRE study may be terminated at any time upon the completion and submission of 2 consecutive tests (for the same outfall) demonstrating compliance. Following the completion of TIE/TRE study, the frequency of monitoring will return to a regular schedule, as defined previously in this section as well in Part I of the permit. **During the course of the TIE/TRE study, the permittee will continue to conduct toxicity testing of the outfall being investigated at the frequency of once every three months but will not be required to perform follow-up tests for that outfall during the period of TIE/TRE study.**

Test procedures, quality assurance practices, determinations of effluent survival/reproduction and survival/growth values, and report formats will be made in accordance with Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, EPA-821-R-02-013, or the most current edition.

Results of all tests, reference toxicant information, copies of raw data sheets, statistical analysis and chemical analyses shall be compiled in a report. The report will be written in accordance with Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, EPA-821-R-02-013, or the most current edition.

Two copies of biomonitoring reports (including follow-up reports) shall be submitted to the division. One copy of the report shall be submitted along with the discharge monitoring report (DMR). The second copy shall be submitted to the Knoxville Division of Water Pollution Control office address.

I. MACROINVERTEBRATE CONTROL MEASURES - BIOCIDE/CORROSION TREATMENT PLAN (B/CTP)

Previous permits addressed "toxic chemicals", biocide(s), and slimicide(s) use at the site for process and non-process flows in a Best Management Plan (BMP) program. A new program for managing the use of these products shall be developed under a Biocide/Corrosion Treatment Plan (B/CTP). This plan is similar to other major-classed TVA facilities in Tennessee.

The B/CTP shall describe chemical applications and macroinvertebrate controls; include all material feed rates, and proposed monitoring schedule(s) to verify that effluent limitations are being met and water quality is being protected. The permittee shall conduct treatments of intake or process waters under this permit using biocides, dispersants, surfactants, corrosion inhibiting chemicals, or detoxification chemicals in accordance with conditions approved and specified in the previous permit for a period of no more that 8-months after the effective date of the permit to allow time for TVA to create the B/CTP and also allow time for the division to review and approve the B/CTP. At that later date, Whole Effluent Toxicity testing (WET) frequency and results reporting will be governed by the B/CTP.

The permittee shall maintain the [new] B/CTP plan at the facility and make the plan available to the permit issuing authority upon request. The permittee shall amend the B/CTP plan whenever there is a change in the application of the chemical additives or change in the operation of the facility that materially increases the potential for these activities to result in a discharge of significant amounts of pollutants. The division shall also be notified in writing within 30-days of any material-vendor changes that will change the names or quantities used of any such chemical additives.

J. RE-ROUTING FLOWS FOR MAINTENANCE PURPOSES

The permittee shall be allowed to re-route flows past normal monitoring points as a temporary measure for maintenance activities. However, such re-routing must be done in such a way that permit limitations are still being met in the receiving waters and compliance with permit limitations is monitored and reported on the DMR's for the re-routed flows. The receiving waters must be the same for the re-routed flows as for the normal discharges.

K. FACILITY INTAKE WATER QUALITY MONITORING REQUIREMENTS

The permittee shall monitor the facility intake water for the following effluent characteristics (in mg/l): Total Hardness (as $CaCO_3$), TSS, Aluminum, Antimony, Arsenic, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Zinc, and Cyanide. All metals shall be reported as Total Recoverable Metal. **All samples reported as "Below Detection Level" shall be analyzed to the Required Detection Level (RDL) specified in Tennessee General Water Quality Criteria, Chapter 1200-4-3-.05(8) except for Mercury which shall be analyzed by EPA Method 1631 or 245.7.** Samples shall be taken

annually with at least 30 days between samples. Two copies of the monitoring results shall be submitted with the Discharge Monitoring Report in the month following sample collection.

L. ALTERNATE THERMAL LIMITATION, SECTION 316(A) OF THE CWA

The 316(a) thermal variance remains in effect for the duration of the permit cycle. For more detail, refer to the rationale portion of this permit and Title 40, Code of Federal Regulations, §125.73 "Criteria and standards for the determination of iterative effluent limitations under section 316(a)".

Within 60 days of the permit effective date, the permittee shall prepare and submit for review by the Division and EPA Region 4 a study plan which outlines how the permittee will conduct assessments that will generate information sufficient to support a determination of whether the Kingston Fossil Plant's alternative thermal limit under Section 316(a) can be continued in its next NPDES permit. The proposed study plan shall be designed to supplement information previously provided by the permittee. The permittee shall implement provisions of the plan within 60 days of its approval by the Division.

M. COOLING WATER INTAKE STRUCTURES - PHASE II, SECTION 316(B) OF THE CWA

316(b) limitations for this facility are determined to be in compliance based on best professional judgment in accordance with 40 CFR 401.14 and 122.43. This permit may be reopened to address compliance with the Rule (316(b)) requirements upon reissuance of a new rule or final guidance by the U.S. Environmental Protection Agency (U.S. EPA).

N. AMMONIA NITROGEN, TOTAL

Selective Non-Catalytic Reduction (SNCR) equipment is used at KIF to lower nitrogen oxide stack emissions, as mandated by the Tennessee Air Quality Board.

The permit shall continue monitoring at Outfall 001 for ammonia nitrogen. Monitoring, on a report-only basis, will include inflow (sampled at the intake structure and effluent from Outfall 001. The net discharge will be calculated and reported. If a calculated value for net addition of ammonia as nitrogen exceeds an action concentration value of 1.5 mg/L, the permittee shall investigate source(s) of ammonia, and proceed with a corrective action(s), if necessary. Furthermore, EFO - Knoxville shall be notified within 24 hours from the time the permittee receives results indicating that an action value of 1.5 mg/L was exceeded. Monitoring will be performed on a monthly basis, using grab samples.

PART IV

BEST MANAGEMENT PRACTICES

Best Management Practices (BMPs) are incorporated as permit conditions to specifically address controls on toxic metals in ash pond discharges. These controls can be site-specific to KIFF operations and practices to address the circumstances of individual fossil plants. Each practice must be developed and measured to document the relationship between operations and effluent metals concentrations.

BMPs should be established based on guidance shown in Attachment 1 with submission of a BMP Plan for division review within 60 days following the permit Effective Date.

The BMP Plan submitted within 60 days following the effective date of this permit shall be amended as necessary to incorporate features of the dry bottom ash and dry gypsum handling projects implemented in the future. The amended plan must be submitted for division review at least 60 days prior to operation of the converted system.

PART V

STORM WATER POLLUTION PREVENTION PLAN

Storm water runoff at the KIF plant that is not discharged through Outfalls 001 and 002 via the ash pond is authorized under the Tennessee Storm Water Multi-Sector General Permit for Industrial Activities (TMSP), Permit Number TNR051787. The Plant shall maintain the existing approved storm water pollution prevention plan (SWPPP) pursuant to the requirements as set forth in the Tennessee Multi-Sector General Permit for Industrial Activities, Sector O: "Storm Water Discharges Associated With Industrial Activity From Steam Electric Power Generating Facilities", and Sector L: "Storm Water Discharges Associated with Industrial Activity from Landfills and Land Application Sites. A copy of these documents can be viewed or printed from the state web site: http://www.state.tn.us/environment/wpc/stormh2o/pmt-o.pdf, and http://www.state.tn.us/environment/wpc/stormh2o/pmt-l.pdf .

The permittee shall amend the SWPPP plan whenever there is a change in the facility or change in the operation of the facility that materially increases the potential for the ancillary activities to result in a discharge of additional, significant amounts of pollutants. Given that the startup of the facility will extend of several months, the permittee shall complete revision to the existing SWPPP for the Kingston Fossil Plant within 180 days of the permit effectiveness.

PART VI
Definitions and Acronyms

DEFINITIONS

For the purpose of this permit, ***"annually"*** is defined as a monitoring frequency of once every twelve (12) months beginning with the date of issuance of this permit so long as the following set of measurements for a given 12 month period are made approximately 12 months subsequent to that time.

A "***bypass***" is defined as the intentional diversion of waste streams from any portion of a treatment facility.

A "***calendar day***" is defined as the 24-hour period from midnight to midnight or any other 24-hour period that reasonably approximates the midnight to midnight time period.

A ***"composite sample"***, in general is a sample collected continuously over a period of 24-hours at a rate proportional to the flow. Composite sample should be a combination of at least 8 sample aliquots of at least 100 milliliters, collected at periodic intervals during the operating hours of a facility over a 24-hour period.

The ***"daily maximum amount"***, is a limitation measured in pounds per day (lb/day), on the total amount of any pollutant in the discharge by weight during any calendar day.

The "***daily maximum concentration***" is a limitation on the average concentration in units of mass per volume (e.g. milligrams per liter), of the discharge during any calendar day. When a proportional-to-flow composite sampling device is used, the daily concentration is the concentration of that 24-hour composite; when other sampling means are used, the daily concentration is the arithmetic mean of the concentrations of equal volume samples collected during any calendar day or sampling period.

"***Degradation***" means the alteration of the properties of waters by the addition of pollutants or removal of habitat.

"***Discharge***" or "discharge of a pollutant" refers to the addition of pollutants to waters from a source.

A "***dry weather overflow***" is a type of sanitary sewer overflow and is defined as one day or any portion of a day in which unpermitted discharge of wastewater from the collection or treatment system other than through the permitted outfall occurs and is not directly related to a rainfall event. Discharges from more than one point within a 24-hour period shall be counted as separate overflows.

An "***ecoregion***" is a relatively homogeneous area defined by similarity of climate, landform, soil, potential natural vegetation, hydrology, or other ecologically relevant variables.

The "***geometric mean***" of any set of values is the n^{th} root of the product of the individual values where "n" is equal to the number of individual values. The geometric mean is equivalent to the antilog of the arithmetic mean of the logarithms of the individual values. For the purposes of calculating the geometric mean, values of zero (0) shall be considered to be one (1).

A ***"grab sample"***, for the purposes of this permit, is defined as a single effluent sample of at least 100 milliliters (sample volumes <100 milliliters are allowed when specified per standard methods, latest edition) collected at a randomly selected time over a period not exceeding 15 minutes. The sample(s) shall be collected at the period(s) most representative of the total discharge.

The "***instantaneous maximum concentration***" is a limitation on the concentration, in milligrams per liter, of any pollutant contained in the wastewater discharge determined from a grab sample taken from the discharge at any point in time.

The "***instantaneous minimum concentration***" is the minimum allowable concentration, in milligrams per liter, of a pollutant parameter contained in the wastewater discharge determined from a grab sample taken from the discharge at any point in time.

The "***monthly average amount***', is a discharge limitation measured in pounds per day (lb/day), is the total amount of any pollutant in the discharge by weight during a calendar month divided by the number of days in the month that the production or commercial facility was operating. Where less than daily sampling is required by a permit, the monthly average amount shall be determined by the summation of all the measured daily discharges by weight divided by the number of days during the calendar month when the measurements were made. For the purpose of this definition, a frequency of 2/Month is representative of 2 separate daily samples, each sample having been collected on a separate day during the monitoring period.

The ***"monthly average concentration"***, other than for *E. coli* bacteria, is a limitation on the discharge concentration, in milligrams per liter (mg/L), and is the arithmetic mean of all daily concentrations determined in a one calendar month period. For the purpose of this definition, a frequency of 2/Month is representative of 2 separate daily samples, each sample having been collected on a separate day during the monitoring period.

A "***one week period***" (or "***calendar-week***") is defined as the period from Sunday through Saturday. For reporting purposes, a calendar week that contains a change of month shall be considered part of the latter month.

"***Pollutant***" means sewage, industrial wastes, or other wastes.

A "***quarter***" is defined as any one of the following three-month periods: January 1 through March 31, April 1 through June 30, July 1 through September 30, and/or October 1 through December 31.

A "***rainfall event***" is defined as any occurrence of rain, preceded by 10 hours without precipitation that results in an accumulation of 0.01 inches or more. Instances of rainfall occurring within 10 hours of each other will be considered a single rainfall event.

A "***rationale***" (or "fact sheet") is a document that is prepared when drafting an NPDES permit or permit action. It provides the technical, regulatory and administrative basis for an agency's permit decision.

A "***reference site***" means least impacted waters within an ecoregion that have been monitored to establish a baseline to which alterations of other waters can be compared.

A "***reference condition***" is a parameter-specific set of data from regional reference sites that establish the statistical range of values for that particular substance at least-impacted streams.

A "***sanitary sewer overflow (SSO)***" is defined as an unpermitted discharge of wastewater from the collection or treatment system other than through the permitted outfall.

For the purpose of this permit, ***"semi-annually"*** means the same as "once every six months." Measurements of the effluent characteristics concentrations may be made anytime during a 6 month period beginning from the issuance date of this permit so long as the second set of measurements for a given 12 month period are made approximately 6 months subsequent to that time, if feasible.

"***Sewage***" means water-carried waste or discharges from human beings or animals, from residences, public or private buildings, or industrial establishments, or boats, together with such other wastes and ground, surface, storm, or other water as may be present.

"***Severe property damage***" when used to consider the allowance of a bypass or SSO means substantial physical damage to property, damage to the treatment facilities which causes them to

become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass or SSO. Severe property damage does not mean economic loss caused by delays in production.

"***Sewerage system***" means the conduits, sewers, and all devices and appurtenances by means of which sewage and other waste is collected, pumped, treated, or disposed.

A "***subecoregion***" is a smaller, more homogenous area that has been delineated within an ecoregion.

"***Upset***" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

The term, "***washout***" is applicable to activated sludge plants and is defined as loss of mixed liquor suspended solids (MLSS) of 30.00% or more from the aeration basin(s).

"***Waters***" means any and all water, public or private, on or beneath the surface of the ground, which are contained within, flow through, or border upon Tennessee or any portion thereof except those bodies of water confined to and retained within the limits of private property in single ownership which do not combine or effect a junction with natural surface or underground waters.

The "***weekly average amount***", shall be determined by the summation of all the measured daily discharges by weight divided by the number of days during the calendar week when the measurements were made.

The "***weekly average concentration***", is the arithmetic mean of all the composite samples collected in a one-week period. The permittee must report the highest weekly average in the one-month period.
"Wet Weather Flow" shall be construed to represent storm water runoff which, in combination with all process and/or non-process wastewater discharges, as applicable, is discharged during a qualifying storm event.

A **"qualifying storm event"** is one which is greater than 0.1 inches and that occurs after a period of at least 72 hours after any previous storm event with rainfall of 0.1 inches or greater.

ACRONYMNS AND ABBREVIATIONS

1Q10 – 1-day minimum, 10-year recurrence interval

30Q5 – 30-day minimum, 5-year recurrence interval

7Q10 – 7-day minimum, 10-year recurrence interval

BAT – best available technology economically achievable

BCT – best conventional pollutant control technology

BDL – below detection level

BOD_5 – five day biochemical oxygen demand

BPT – best practicable control technology currently available

$CBOD_5$ – five day carbonaceous biochemical oxygen demand

CEI – compliance evaluation inspection

CFR – code of federal regulations

CFS – cubic feet per second

CSO – combined sewer overflow

CWA – Clean Water Act

DMR – discharge monitoring report

EFO – environmental field office

LB(lb) - pound

IC_{25} – inhibition concentration causing 25% reduction in survival, reproduction and growth of the test organisms

LC_{50} – acute test causing 50% lethality

MDL – method detection level

MGD – million gallons per day

MG/L(mg/l) – milligrams per liter

ML – minimum level of quantification

ml – milliliter

NODI – no discharge

NOEC – no observed effect concentration

NPDES – national pollutant discharge elimination system

PL – permit limit

RDL – required detection limit

STP – sewage treatment plant

TCA – Tennessee code annotated

TDEC – Tennessee Department of Environment and Conservation

TIE/TRE – toxicity identification evaluation/toxicity reduction evaluation

TMDL – total maximum daily load

TRC – total residual chlorine

TSS – total suspended solids

WQBEL – water quality based effluent limit

ATTACHMENT I

Best Management Practices

Attachment 1
BEST MANAGEMENT PRACTICES [2]

GENERAL CONDITIONS

For purposes of this part, the terms "pollutant" or "pollutants" refer to any substance **listed as toxic under Section 307(a)(1) of the Clean Water Act, oil, as defined in Section** 311(a)(1) of the Act, and any substance listed as hazardous under Section 311 of the Act. The permittee shall develop and implement a Best Management Practices (BMP) plan which prevents, or minimizes the potential for, the release of pollutants (including oil and grease) from *ancillary activities*, including material storage areas; plant site runoff; in-plant transfer, process and material handling areas; loading and unloading operations, and sludge and waste disposal areas, to the waters of the State of Tennessee through plant site runoff; spillage or leaks; sludge or waste disposal; or drainage from raw material storage.

GENERAL REQUIREMENTS

The BMP program shall:

1. Be documented in narrative form, and shall include any necessary plot plans, drawings, or maps;

2. Establish specific objectives for the control of toxic and hazardous pollutants:

   a. Each facility component or system shall be examined for its potential for causing a release of significant amounts of toxic or hazardous pollutants to waters of the State of Tennessee due to equipment failure, improper operation, natural phenomena such as rain or snowfall, etc.;

   b. Where experience indicates a reasonable potential for equipment failure (e.g., a tank overflow or leakage), natural condition (e.g., precipitation), or other circumstances to result in significant amounts of toxic or hazardous pollutants reaching surface waters, the plan should include a prediction of the direction, rate of flow, and total quantity of toxic or hazardous pollutants which could be discharged from the facility as a result of each condition or circumstance;

3. Establish specific best management practices to meet the objectives identified under section B.2. contained herein, addressing each component or system capable of causing a release of significant amounts of toxic or hazardous pollutants to the waters of the State of Tennessee;

4. The BMP program:

   a. May reflect requirements for Spill Prevention Control and Countermeasure (SPCC) plans under section 311 of the Act and Title 40 CFR part 112, and may incorporate any part of such plans into the BMP program by reference;

   b. Shall assure the proper management of solid and hazardous waste in accordance with regulations promulgated under the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976 (RCRA) (40 U.S.C. §6901, et. seq.). Management practices required under RCRA regulations shall be expressly incorporated into the BMP program; and,

   c. Shall address the following points for the ancillary activities listed in section A.1.:

---

[2] Note: Additional technical information on BMPs and the elements of a BMP program is contained in EPA publications entitled "Guidance Manual for Developing Best Management Practices (BMP)" (EPA 833-B-93-004) and "Stormwater Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices" (EPA 832-R-92-006).

i. Statement of policy;
ii. Spill Control Committee: responsible for BMP program implementation and subsequent review and updating;
iii. Material inventory: identification of all sources and quantities of toxic and hazardous substances handled or produced, including plant drawings and plot plans, materials flow diagrams, physical, chemical, toxicological, and health information on toxic and hazardous substances, and investigation and evaluation of new materials;
iv. Material compatibility: evaluation of process changes or revisions for materials compatibility, review of properties of chemicals handled and materials of construction, evaluation of means of chemical disposal and incompatibility, cleansing of vessels and transfer lines, and use of proper coatings and cathodic protection on buried pipelines if required;
v. Employee training: meetings to be held at frequent intervals, spill drills, adequate job training, transmission of information on past spills and causes, informing employees of BMP program components, training in cleanup procedures, and review and interface with safety program;
vi. Reporting and notification procedures: maintenance of records of spills through formal reports for internal review, notification as required by law to governmental and environmental agencies in the event of a spill, and procedures for notifying the appropriate plant personnel;
vii. Visual inspections: routine inspections with visual observations of storage facilities, transfer pipelines, and loading and unloading areas, detailed inspections of pipes, pumps, valves, fittings, tank corrosion, tank support and foundation deterioration, etc.;
viii. Preventive maintenance: identification of equipment and systems to which the preventive maintenance program should apply, periodic inspection and testing of such equipment and systems, appropriate adjustment, repair, or replacement of parts, and maintenance of preventive maintenance records;
ix. Good housekeeping: neat and orderly storage of chemicals, prompt removal of small spillage, regular garbage pickup, maintenance of dry and clean floors, proper pathways and walkways, minimum accumulation of liquid and solid chemicals on the ground or floor in a building, and stimulation of employee interest in good housekeeping;
x. Security: plant patrols, fencing, good lighting, traffic control, controlled access where appropriate, visitor passes, locked entrances, locks on drain valves and pumps for chemical storage tanks, and television monitoring.

DOCUMENTATION

The permittee shall maintain the BMP plan at the facility and shall make the plan available to the permit issuing authority upon request.

BMP PLAN MODIFICATION

The permittee shall amend the BMP plan whenever there is a change in the facility or change in the operation of the facility, which materially increases the potential for the ancillary activities to result in a discharge of significant amounts of pollutants.

MODIFICATION FOR INEFFECTIVENESS

If the BMP plan proves to be ineffective in achieving the general objective of preventing the release of significant amounts of pollutants to surface waters and the specific objectives and requirements under section B, the permit shall be subject to modification pursuant to 40 CFR 122.62 or 122.63 to incorporate revised BMP requirements. Any such permit modification shall be subject to review in accordance with the procedures for permit appeals set forth in accordance with 69-3-110, Tennessee Code Annotated.

RATIONALE

TVA - Kingston Fossil Plant
NPDES PERMIT NO. TN0005452
Harriman, Roane County, Tennessee

Permit Writer: Bob Alexander, 11 October 2010

I. DISCHARGER

TVA - Kingston Fossil Plant
714 Swan Pond Road
Harriman, Roane County, Tennessee

Official Contact Person:
Lindy Johnson, Manager
Water Permits and Compliance
(423) 751-3361

Nature of Business:
fossil-fueled steam-electric generating plant with 9 coal-fired units with a combined rated capacity of 1,700 megawatts

SIC Code(s): 4911 (Electric, Gas, and Sanitary Services, Electric Services subcategory)
Industrial Classification: Primary
Discharger Rating: Major

II. PERMIT STATUS

Issued September 1, 2003
Expired August 31, 2008
Application for renewal received December 4, 2007

Watershed Scheduling
Environmental Field Office: Knoxville
Primary Longitude: -84.505556 Primary Latitude: 35.904167
Hydrocode: 6010207 Watershed Group: 3
Watershed Identification: Clinch-Lower
Target Reissuance Year: 2013

Integration of NPDES Permit TN0080870 Flue Gas Desulfurization(FGD)
This permit incorporates terms and condition of NPDES Permit TN0080870 issued on September 22, 2009 to expire September 30, 2013 for Internal Monitoring Point (IMP) 02A and the FGD system. Upon issuance of this permit the FGD permit will be terminated. IMP 02A was labeled as Outfall 01A in Permit TN0080870 and has been renamed IMP 02A due to its proximity to Outfall 002.

For reference, a portion of the FGD permit's Administrative Record follows:

> *On February 13, 2009, the Tennessee Valley Authority (TVA) submitted an application for an NPDES Permit for the discharge of effluent from a gypsum settling pond at the Kingston Fossil Plant in Harriman, TN. The TN Department of Environment and Conservation (TDEC), Division of Water Pollution Control (the division) published a draft permit TN0080870 for the facility on May 4, 2009. Also, the division issued a public notice on the availability of the draft permit for public review and for a public hearing held in Oak Ridge. The hearing was held on June 8, 2009, and was followed by a comment period through July 8, 2009.*
>
> *The September 22, 2009 Notice of Determination addressed comments presented at the hearing and submitted during the public notice period and presented TDECs decision regarding the FGD permit and rationale for that decision.*

III. FACILITY DISCHARGES AND RECEIVING WATERS

A. FACILITY DISCHARGES

1. INTRODUCTION

Discharges are described below for routine plant operations as well as summary information regarding the December 2008 ash spill into the Emory and Clinch Rivers. The NPDES permit encompasses the blended discharge from CERCLA activities and routine plant operations because there's no way to segregate them for regulatory purposes.

2. CERCLA DISCHARGES FROM 2008 COAL ASH SPILL

This permit Rationale contains an **overview** of the discharges from the 2008 coal ash spill into the Clinch and Emory Rivers. The following section summarizes dredging wastewater flowing through the ash pond as well as the uncontrolled discharges of coal ash transported by flow of Emory and Clinch Rivers. From March 2009 to June 2010, the KIF ash pond discharge at **Outfall 001** conveyed a blend of sluiced coal ash from plant operations along with water from CERCLA dredging operations in the Emory River. This discharge was mostly continuous while plant discharges have varied from 12-1400 MGD at full operation down to 10 MGD during shutdown.

Shown below are references and links to Internet websites which fully describe the history, details, and sources for updated information on the release and remedial activities:

- http://www.epakingstontva.com/default.aspx
- http://tennessee.gov/environment/kingston/index.shtml
- http://www.tva.gov/kingston/index.htm
- http://health.state.tn.us/coalashspill.htm

TDEC has maintained information on the ash spill effects on surface water, such as[3]

> *The effects of the TVA ash spill on water quality are a mix of obvious and more subtle impacts. The physical impacts were immediate as ash from the failed impoundment completely filled two embayments and a portion of the Emory River main channel. Ash has also been carried downstream into the Clinch River and plumes have been observed entering the Tennessee River after heavy rainfall. The initial impacts of the slide killed or displaced fish and other aquatic life or caused physical impacts to fish through gillways, ingestation, etc.*
>
> *Daily water quality testing has not indicated an impact to drinking water facilities. Rockwood and Kingston water is safe to drink. Water in close proximity to the spill site has contaminants at levels that would not be suitable for drinking water supply. However, there are no water treatment facilities in this immediate area.*
>
> *The more subtle potential impacts to aquatic life in the spill area will need to be carefully tracked. For this reason, monitoring of area rivers and the collection of fish for tissue analysis began immediately following the event and will continue. Exceedances of Tennessee's clean water goals have been noted. Parameters of concern that we are monitoring closely include arsenic, lead, thallium, and mercury. Fish tissue samples will be tracked for the metals associated with the ash.*
>
> *Because clean water goals include criteria that measure both acute (short term) and chronic (longer term) toxicity, it may be some time before we can reach conclusions about the breadth of impacts to water quality in the Kingston area. In the meantime, we have committed to continued area monitoring and to make information available to the public as we fulfill our mandate the protect public health and water quality.*

The TVA Ash Recovery Project also provides weekly reports summarizing the lab results of surface water monitoring. An excerpt from the 5-11 July report[4] follows:

> *Comparisons to the F&AL are performed for dissolved concentrations only. On the Tennessee River, arsenic was detected in 12 of 13 samples and selenium (dissolved) was detected in one sample. Arsenic and selenium concentrations were both well below the TDWS and F&AL criteria. Thallium was not detected in any Tennessee River sample. Dissolved copper previously reported as detected in one sample exceeding the F&AL was determined to be a non-detect during data validation.*
>
> *On the Clinch River, arsenic was detected in 40 of 40 samples and selenium detected in 3 of 40 samples at concentrations well below the TDWS and F&AL. Total and dissolved thallium m was detected in 1 of 40 samples and exceeded the TWQC (0.00024 mg/L). On the Emory River, arsenic was detected in 43 of 49 samples and selenium was detected in 10 of 49 samples. Two detected arsenic concentrations exceeded the TDWS. All detected selenium concentrations were less than the TDWS and F&AL.*
>
> *Thallium was detected in 4 of 49 samples and all detected concentrations exceeded the TWQC. Dissolved copper was detected in 28 of 49 samples with one concentration collected at ERM 12.2 reported as exceeding the F&AL rejected during validation. Lead was detected in 32 of 49 samples, with one sample from ERM 2.1 exceeding the TDWS.*

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[3] Available at http://tennessee.gov/environment/kingston/surface_water.shtml.
[4] Available at http://www.tva.gov/kingston/weekly/pdf/071110.pdf.

EPA Data Summaries of Outfall 001 are also available – note that Outfall 001 is labeled as "Stilling Pond" in the excerpt below[5]

Comparing Results to Fish & Aquatic Life Criteria for Arsenic and Selenium

	Analyte*	Criteria		Max	Min	Avg	Detects	Samples	Excursions	Percent Exceeding F&AL
Embayment										
	Arsenic	0.15	ppm	0.104	0.00087	0.0220193116	277	277	0	0.00%
	Selenium	0.005	ppm	0.065	0.00042	0.0074260082	243	277	119	42.96%
Dredge Plume										
	Arsenic	0.15	ppm	0.0383	0.00033	0.0047490799	228	292	0	0.00%
	Selenium	0.005	ppm	0.0123	0.00034	0.0012523423	111	292	2	0.68%
Stilling Pond										
	Arsenic	0.15	ppm	0.0949	0.00239	0.0154173729	236	237	0	0.00%
	Selenium	0.005	ppm	0.0246	0.00077	0.0048384681	235	237	84	35.44%
Plant Effluent										
	Arsenic	0.15	ppm	0.0136	0.00085	0.0039353333	105	106	0	0.00%
	Selenium	0.005	ppm	0.00332	0.00034	0.0008872917	48	106	0	0.00%
Emory River										
	Arsenic	0.15	ppm	0.0281	0.00033	0.0019177517	298	1000	0	0.00%
	Selenium	0.005	ppm	0.00134	0.00017	0.0004310256	39	1003	0	0.00%
Clinch River										
	Arsenic	0.15	ppm	0.0242	0.00033	0.0011335179	307	795	0	0.00%
	Selenium	0.005	ppm	0.00091	0.00033	0.00047	16	796	0	0.00%
Tennessee River										
	Arsenic	0.15	ppm	0.00077	0.00033	0.0004530952	42	214	0	0.00%
	Selenium	0.005	ppm	ND	ND	ND	0	215	0	0.00%

* The standard for selenium applies to the concentration in the total fraction. The standard for arsenic applies to results from the dissolved fraction.

NOTE: Statistics and charts in this report do not include raw data in "Draft" status.

3. ASH RECOVERY AND FUTURE PLANT WASTEWATER DISCHARGES

Following completion of Emory-Clinch River dredging operations in June 2010, TVA plans to remove coal ash from the Swan Pond embayment. EPA and TDEC have approved the plan for removal and on-site storage, closing the disposal area [and the ash pond, but not the stilling pond] and restoration of the embayment ecosystem using upland and wetland plant communities.

On May 18, 2010, EPA approved the Action Memorandum for the remaining coal ash cleanup noted above - see http://www.tva.gov/kingston/admin_record/pdf/NTC/NTC5.pdf.

The Remedial Action Work Plan developed to implement these actions establishes these ongoing process wastewater discharges to be treated in the ash/stilling pond:

- Flows from fly ash sluice waters(flow TBD) - to cease by June 2012,
- Flows from bottom ash sluice waters (flow TBD) - to cease by December 2012,
- Dewatered gypsum wastewater from FGD process (flow TBD),
- Remaining process wastewater flow of approx. 8.5 MGD continue to be treated and discharged through the stilling pond and Outfall 001, as follows:

[5] Available at http://www.epakingstontva.com/Air%20and%20Water%20Data%20Summaries/June%202010%20Water%20Quality.pdf.

From the permit application, routine plant discharges include:

FLOW (MGD)	DISCHARGE SOURCE
0.180	Redwater wetlands
0.145	Coal yard runoff pond discharge
0.002	Nonchemical metal cleaning wastes
0.002	Ammonia storage runoff
0.267	Water treatment plant wastes
7.712	Station sump discharge
0.574	Precipitation
-0.238	Evaporation *
-0.170	Seepage to redwater wetland
0.012	AAF precipitator washdown
8.486	**TOTAL DISCHARGE**

*Flow from precipitation and evaporative losses are overestimated since values are calculated using both ash pond and stilling pond surface area.

4. FOSSIL PLANT OPERATIONAL DISCHARGES

Wastewater originates from the process of generation of electric power from a fossil-fueled steam-electric plant. The plant has 9 coal-fired units with a combined rated capacity of 1,700 megawatts.

TVA - Kingston Fossil Plant discharges fly ash and bottom ash sluice waters, pumping basin discharges including storm water runoff from the coal pile and utility building areas, nonchemical metal cleaning wastes, water treatment plant wastes, station sump discharges including ash system leakage and boiler bottom overflow, floor washing wastewater, miscellaneous equipment cooling and lubricating water, boiler makeup water leakage, analytical process water, roof drains, precipitator washdown water, and redwater treatment wetlands discharges from **Outfall 001**, FGD wastewater via IMP 02A, once through condenser cooling water, boiler blowdown water, lab sample station water, intake screen backwash, miscellaneous equipment cooling water and storm water runoff from **Outfall 002**, storm water and non-contact cooling water from **Outfall 006**, storm water runoff and abandoned ash pond area seepage from **Outfall 007**, and drainage from sluice line trench from **Outfall 00**8 to Clinch River at mile 2.9.

As noted in Appendix 1, current operations at KIF result in these flows (approx.):

Outfall 001	40.5	MGD	ash sluice, various plant processes*
Outfall 002	1296	MGD	cooling water, stormwater
Outfall 006	0.52	MGD	cooling water, stormwater
Outfall 007	0.052	MGD	stormwater, seepage
Outfall 008	0.016	MGD	sluice line trench, rainwater
IMP 02A	1.0	MGD	FGD gypsum pond

Appendix 1 summarizes facility discharges and receiving stream information.

* Outfall 001 flow of 36.12 MGD for period 2009-10 is used for effluent limits calculations.

5. DRY FLY ASH CONVERSION AND OUTFALL 001 FLOW REDUCTION

Construction began in April 2010 for dry ash silos and supporting infrastructure to allow for offsite disposal or marketing of the ash. **Anticipated completion date is June 2012.** Existing water-driven equipment will be removed and new vacuum pumps and filter separators will remove fly ash from the air pollution control equipment for offsite disposal or marketing.

As described in the TVA Environmental Assessment for the project, reduction in flow at Outfall 001 is anticipated from 40.5 MGD to approximately 15.3 MGD, or a total reduction of approximately 25.3 MGD. The conversion project could have these effects on Outfall 001:[6]

- Additional time for mixing/settling of wastewater treated in the ash pond,
- Reduced alkalinity in the ash pond with reduced effectiveness in treating acidic wastewaters,
- Leaching of metals and other constituents found in fly ash would be eliminated,
- Loadings for metals discharged through the ash pond could be reduced by 80%.
- Stormwater from coal yard could become major portion of flow into the ash pond potentially requiring additional treatment to meet existing pH limits.

As of this writing, conversion to dry bottom ash and implementation of gypsum dewatering are both anticipated for completion by year-end in 2012.

6. CLOSURE OF ASH POND

The CERCLA Removal Action Work Plan (RAWP), June 2010, for cleanup of the Swan Pond embayment describes the process of final onsite ash remediation from the 2008 spill, as well as the closure of the ash pond with offsite disposal of all future ash generated. Excerpts of the RAWP are shown below[7]:

> *Ash stacking will be closely coordinated with closure of the Ash Pond and other ongoing TVA KIF projects, including the dry ash conversion project for both fly ash and bottom ash, and construction of* ***new water treatment facilities for process flows*** *from the operating power plant. Ash stacking within the Ash Pond can only occur once plant flows have been redirected from the Ash Pond. [emphasis added]*[8]

> *At the end of the ongoing time-critical removal action, ash will be removed from the Ash Pond as needed to establish the free water volume required by the NPDES permit; the ash will be removed either by mechanical or hydraulic dredging, then dried and disposed with the time-critical ash. TVA is currently implementing a dry ash conversion project for both fly ash and bottom ash. Ash generated from the KIF plant operation will continue to be discharged to the Sluice Trench until such time as the plant has been converted to dry ash processing methods. The generated ash will be dipped out of the Sluice Trench and/or dredged from the Ash Pond, and stockpiled in the Ball Field for processing prior to disposal of the plant-generated ash. [emphasis added]* [9]

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[6] TVA, *Draft Environmental Assessment: Kingston Dry Fly Ash Conversion, March 2010, Sec. 1.1.2. A difference exists in wastewater flows (non-sluice waters) reported in the permit application and this EA document.*

[7] TVA, *Kingston Ash Recovery Project, Non-Time Critical Removal Work Plan for the Embayment/Dredge Cell, 2 June 2010*

[8] *Id, pg 1-12*

[9] *Id, pg 5-2*

Decontamination Liquids. Decontamination fluids will be collected from personnel and equipment wash stations and taken to the Sluice Trench for disposition with the KIF plant wastewater discharges. Treatment will be conducted together with plant wastewaters in the Ash Pond and Stilling Pond, and discharged through the NPDES-permitted outfall. During final closure of the Ash Pond, once the KIF dry ash conversion project is complete and new wastewater treatment facilities are operational, then the decontamination liquids will be transported to an appropriate KIF plant washdown area for disposition with plant wastewater discharges. [emphasis added] [10]

***Dredged Ash**. Ash and associated soil and sediment will also be hydraulically dredged from the embayment and processed in the Rim Ditch and adjacent Ball Field. Approximately 0.2 million cy of dried ash will be loaded onto dump trucks and transported to the Dredge Cell/Ash Pond for dry stacking, which would result in approximately 9,000 truck loads. Existing onsite haul roads leading from the Ball Field to the Dredge Cell along Dike D will continue to be used; therefore transportation impacts to local residents are expected to be negligible. Near the end of final dredging, dredged material will be allowed to fill the Ash Pond to accommodate final closure, which will reduce the need for truck hauling.*[11]

Closure Plan
The sequence of construction requires careful coordination between excavation, dredging, perimeter berm construction, ash stacking, the KIF dry ash conversion project, and the construction of an alternative wastewater treatment facility for KIF. The plan assumes that the dry ash conversion project for fly ash will be completed by June 2012 and for bottom ash by December 2012, at which time plant-generated fly ash will no longer be discharged to the Ash Pond. ***The plan also assumes that the wastewater treatment facility will be completed by January 2013, at which time plant-generated wastewaters will no longer be discharged to the Ash Pond****. The current planning level schedule shows filling of the Ash Pond beginning in the spring of 2013 [emphasis added].* [12]

Ash Pond ash stacking. The final dredging of the middle embayment will initiate filling of the Ash Pond. At that time, the perimeter berm and foundation stabilization zone can be constructed around the Ash Pond, and the working platform can be constructed. Restoration of the middle embayment ecosystem can also begin. Because the Ball Field will no longer be needed for ash processing, it will be closed, with the materials removed from the Ball Field dry stacked in the Ash Pond. Ash will continue to be excavated from the south Dredge Cell to lower its elevation and dry stacked in the Ash Pond. ***The Ash Pond is expected to be filled to capacity by late summer 2014****. Once final grades are reached within both the south Dredge Cell and Ash Pond, closure of both areas can begin, by placing the final cap and cover first in the south Ash Pond and progressing across the site to the Dredge Cell (Cell 1).[emphasis added]*[13]

Based on TVA's planning for additional wastewater treatment and ash pond closure noted above, permit modifications will likely be required during this permit term. TDEC, TVA, and EPA will continue to closely coordinate between CERCLA and NPDES staff to maintain proper permit coverage.

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[10] *Id, pg 5-2*
[11] Id, pg 6-2
[12] *Id,* Pg 8-4
[13] *Id, pg 8-5*

7. FLUE GAS DESULFURIZATION WASTEWATER IS INCLUDED

Internal Monitoring Point 02A

TVA - KIF Flue Gas Desulfurization (FGD) System discharges approximately 1 mgd from a retention pond into plant discharge channel, also called Outfall 002 which has a flow of approx. 1297 MGD, to Clinch River mile 2.5. Wastewater is generated by the FGD process when wet scrubbing of flue gas from the combustion of coal is used to remove SO2 emissions. Wet scrubber FGD processes include spraying limestone slurry in an adsorber with conversion of dissolved calcium sulfite to calcium sulfate, or gypsum. The gypsum slurry is approximately 15 – 20% solids which are pumped from the Kingston plant building eastward to the "peninsula" on the Clinch River for treatment in a 135-acre gypsum settling pond.

Scrubber wastewater characteristics are supersaturated in calcium sulfate and are hot, mildly acidic, and corrosive. Wastewater will vary according to coal and limestone composition and type of scrubber system. As supplies of coal and limestone change, wastewater characteristics will also vary.

KIF will discharge effluent from the gypsum settling pond at Internal Monitoring Point 02A to Clinch River. The discharge will mix immediately in the discharge channel with Outfall 002 under NPDES Permit TN0005452. The gypsum pond discharge will mix with this significantly larger flow of condenser cooling water discharge of almost 1300 mgd from the plant.

Water quality constituents of concern include metals such as arsenic, mercury, selenium, boron, cadmium, and zinc, which are in the dissolved form.. In addition to metals, the constituents in limestone slurry include chlorides and inert solids containing iron and aluminum. Chlorides can also be a concern.

The principal feature of this discharge is the fact that Internal Monitoring Point 02A will discharge at the outlet of condenser cooling waters into the plant discharge channel which mixes with Clinch River waters at River Mile 2.5.

At the time of this writing, TVA has stated the dewatering of FGD wastes will be operational by the year-end in 2012. Dewatering will likely reduce, but not eliminate, the quantity of flow from the 1 MGD discharge through Internal Monitoring Point 02A, thus the outfall is included in this permit.

8. OUTFALL 005 IS DELETED DURING REMEDIATION (INTERNAL MONITORING POINT 005)

An outfall has been deleted from the previous permit - Internal Monitoring Point (IMP) 005, which conveyed effluent from the former chemical metal cleaning waste ponds which were closed during the ash spill remediation.

9. STORMWATER

Storm water discharges associated with the industrial activity of this facility are covered by the Tennessee Multi-Sector General Storm Water Permit TNR051787. Storm water concerns associated with this facility are covered in this general permit and will, therefore, not be addressed in the new permit.

B. CLINCH RIVER RECEIVING WATER QUALITY

The Clinch River waters receiving this discharge are part of the TVA Watts Bar Reservoir, which extends approximately 20 miles upstream on the Clinch River to Melton Hill Dam and 12 miles on the Emory River. This ash pond/gypsum pond discharge mixes with approximately 1.3 billion gallons per day of fossil plant cooling water which is pumped from the Emory River and Clinch River water from the reservoir.

The Clinch River arm of Watts Bar Reservoir is designated as impaired by TDEC in the 2008 303 (d) list, a compilation of streams and lakes in Tennessee that are "water quality limited" or are expected to exceed water quality standards in the next two years and need additional pollution controls. Pollutants of concern are PCBs, Mercury, and Chlordane.

Pollutant sources are identified as Industrial Point Sources and contaminated sediments primarily from upstream Department of Energy facilities, and atmospheric deposition. A fishing advisory is established for consumption of **PCBs**. The advisory states that "Catfish, striped bass and hybrid (striped bass-hybrid bass) should not be eaten. Precautionary advisory for white bass, sauger, carp, smallmouth buffalo, and largemouth bass" indicates "Children, pregnant women, and nursing mothers should not consume the fish species named. All other persons should limit consumption of the named species to one meal per month".

Upstream sources including DOE facilities have been identified as the cause of elevated levels of **mercury** in fish tissue in waters immediately upstream of the Kingston plant. Mercury levels in fish tissue due to legacy CERCLA releases have also been identified in discharges of Poplar Creek, which enters the Clinch River upstream at RM 12.

The stream is considered Category 5, meaning one or more uses are not being met and a TMDL is needed for the listed pollutants. Additional information on the 303(d) list is found at http://www.state.tn.us/environment/wpc/publications/2008_303d.pdf.

The water quality conditions described above, i.e., PCB in fish tissue, have not been attributed to TVA Kingston discharges proposed in this permit. The TVA permit application reported no detectable concentrations of PCBs and chlordane. Further, sources of **chlordane** located upstream of KIF are not identified.

Mercury discharges from the ash/gypsum ponds can potentially contribute to the existing problems from upstream sources. Sufficient data does not exist on conditions in this segment of the Clinch River to determine a numerical mercury effluent limit needed to protect human health. Current EPA guidance requires that data be obtained on total and methylmercury concentrations in the water column along with mercury concentrations in fish tissue adequate to establish a Bioaccumulation Factor.

Until a Bioaccumulation Factor is defined, load allocations cannot be established. For a point source such as the FGD, a Wasteload Allocation is applicable. Establishment of the Wasteload Allocation for mercury in this segment of the Clinch River requires development of a Total Maximum Daily Load (TMDL), which accounts for both point and nonpoint sources of mercury loading as well as upstream sources.

Initial data will be obtained through this permit for mercury loading from the FGD process for input into any future TMDL.

1. FLOW CONDITIONS VICINITY OF KINGSTON FOSSIL PLANT

The complicated flow conditions are summarized below:

Flow patterns can be complex in the Emory and Clinch rivers embayments. When Emory River flow is greater than the 2,100 cfs required by the cooling water system for KIF, the Emory River flows downstream into the Clinch River, and the Emory River water alone provides all KIF cooling water. According to stream gauge records, this happens about 18 percent of the time and is most likely in the winter flood season, which occurs December through March.

When Emory River flow is not adequate (less than 2,100 cfs) to provide all of the cooling water needed by KIF, water flows upstream from the Clinch River through the Emory River embayment. This is encouraged by the presence of an underwater weir in the Clinch River just downstream of the Emory River confluence. Under some other conditions, the Emory River also flows backward upstream of the plant. Water is pushed up the Emory River as a result of inflows that raise the pool elevation in Watts Bar Reservoir. Such inflow typically occurs when the reservoir is filling in the spring or during a spring flood event. Different rates and timing of releases from Watts Bar, Fort Loudoun, and Melton Hill reservoirs can also cause reverse flows in the Clinch River arm of Watts Bar Reservoir. There is, thereby, the potential for the water from the Clinch River to flow upstream on the Tennessee River during filling of Watts Bar Reservoir.

These flow patterns are further complicated by temperature and density differences in the water. Warmer water is less dense and therefore stays on the surface of a reservoir. In the summer, sun and air temperatures warm the surface water, and this thermal layering becomes stable (stratification). The Emory River water also warms up, though not as much as the water on the surface of the reservoir, while Norris Dam and Melton Hill Dam discharges keep the Clinch River cool. When Clinch River water flows upstream into the Emory River embayment to the KIF intakes in the summer, this cooler water flows along the bottom of the embayment, and the warmer Emory River water can flow downstream over the top of the cooler Clinch River water.[14]

2. SURFACE WATER QUALITY DATA - UPDATED FROM ASH SPILL PROJECT - - JUNE 16, 2010

Data is discussed above in Section III.A. from TDEC, EPA, and TVA surface water monitoring programs. An excerpt is shown from the EPA Region 4 website depicting recent analyses from June 2010, focused on the two principal constituents of concern: arsenic and selenium. These data indicate no exceedances of TN WQC for these constituents.

3. FISH TISSUE DATA

Immediately following the ash spill, TDEC collected fish tissue for analyses and posted the report[15]:

The State of Tennessee collected and/or analyzed fish tissue samples from the Kingston area January – May of 2009. The analyses, performed by an EPA certified laboratory, were for metals associated with coal ash.

- *All levels of metals thus far, with the exception of two catfish samples that exceeded 0.3 parts per million of mercury, are below human health protection standards.*

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[14] TVA, *Draft Environmental Assessment, Kingston Fly Ash Conversion, March 2010,* Sec .1.1.1, available at http://www.tva.com/environment/reports/kif_dry_ash/dea.pdf.

[15] See http://www.state.tn.us/environment/kingston/pdf/fishtissue/fish_tissue_data_summary081809.pdf.

- *Selenium levels in fish are well below EPA's proposed toxicity standards for protection of fish and other aquatic life.*
- *The public is urged to follow the existing fishing advisory on the lower Clinch River. There is no justification, at present, to modify this information.*

Additional fish tissue samples have been collected and are awaiting analysis. The state will continue to monitor the levels of contaminants in fish tissue and will inform the public if current conditions change.

4. GROUNDWATER AT ASH DISPOSAL SITE

Groundwater monitoring at the ash disposal sites is required by the TDEC Div. of Solid Waste Management (DSWM). DSWM records indicate that ongoing groundwater monitoring at KIF has detected metals at levels below MCLs for, among others, arsenic, cadmium, and silver.

TVA has not developed quantitative estimates of KIF ash pond groundwater seepage rates or contaminant loadings to Watts Bar Lake. No estimates of groundwater loadings are available for comparison to the ash pond discharge. In other ash pond locations, this groundwater seepage rate is reported as an insignificant factor in affecting surface water as compared to the ash pond discharge to the Lake of 40 MGD[16].

Since it's not feasible to measure the potential groundwater effect in the depths of the Lake, assessment of the aquatic community remains the only viable option. TVA has compiled data on Reservoir Fish Assemblage Index (RFAI) in Watts Bar Lake, upstream and downstream of KIF, every other year since 200117. These data demonstrate a balanced, indigenous population has been maintained in the vicinity of the plant.

IV. APPLICABLE EFFLUENT LIMITATIONS GUIDELINES

A. General

The subject facility is classified under SIC code 4911, "Electric, Gas, and Sanitary Services", "Electric Services" subcategory. Best Practicable Control Technology (BPT) and Best Available Technology Economically Achievable (BAT) limitations from 1982 for several effluent characteristics are given in sections §423.12 and §423.13 respectively for the following wastestreams: fly ash and bottom ash transport water, metal cleaning wastes, once through cooling water (main condensers), cooling tower blowdown, coal pile runoff, and low volume waste sources. Low volume waste sources are defined in §423.11(b) as "*...wastewater from all sources except those for which specific limitations are otherwise established...*" – this specifically addresses FGD wastewaters from wet scrubber air pollution control systems.

Consequently, 40 CFR Part 423, "Steam Electric Power Generating Point Source Category" effluent guidelines are applicable to the process wastewater discharges from Outfalls 02A, 001 and 002, as well as the Internal Monitoring Point 005. Appendix 2 lists the various BPT and BAT effluent guidelines applicable to the various waste streams from these outfalls and internal monitoring points.

B. Numeric Effluent Limits on Ash Pond Outfalls 001 and 02A

As shown in Section XI below, a **Best Professional Judgment Analysis** is presented to address the issue of numeric effluent metals limits. The Analysis considers the following:

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[16] TVA, *Johnsonville Steam Plant Assessment of Leachate Containment Ash Pond D,* Report No. WR28-2-30-101, June 1986.

[17] TVA, Results of Biological Monitoring in the Vicinity of Kingston Fossil Plant During Autumn 2001 in Support of a Continued 316(a) Thermal Variance, December, 2007.

- 1982 Steam Electric Power Effluent Limitations Guidelines
- 2009 EPA Steam Electric Power GeneratinPoint Source Category: Final Detailed Study Report (EPA 821-R-09-008)
- 2010 USEPA Rulemaking Process for ELGs for Coal-Fired Plants
- USEPA MEMORANDUM – NPDES Permitting at Steam Electric Fossil Plants, dated 7 June 2010
- TVA Proposed Conversion of Wet Ash Handling to Dry Storage
- TDEC Procedures for Establishing Effluent Limits
- Comments on other fossil plant Draft NPDES Permits

The BPJ Analysis concludes that establishment of numeric metals limits is infeasible. For the permit term of 2010 – 2013, the NPDES permit for TVA Kingston Fossil Plant should incorporate non-numeric Best Management Practices to control concentrations of toxic metals, consistent with 40 CFR 122.44(k)(3). Monthly monitoring of effluent metals concentrations is required in the renewed permit.

Best Management Practices must be employed under a BMP Plan as required per Attachment 1.

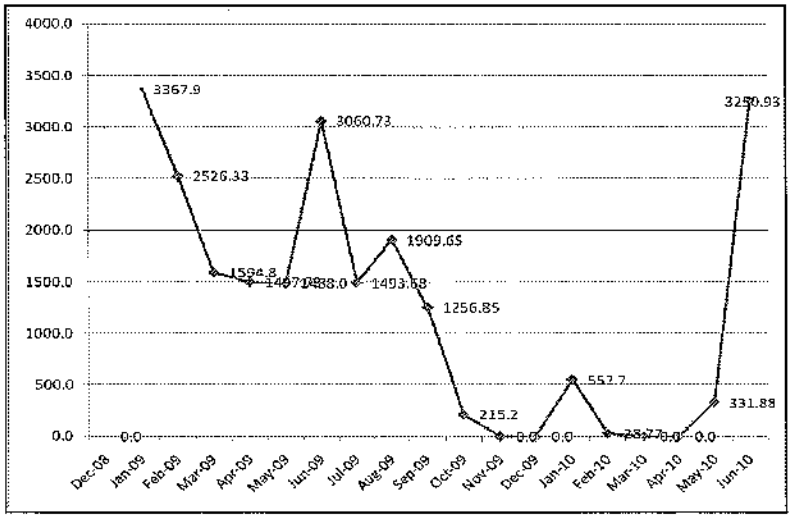
V. PREVIOUS PERMIT LIMITS AND MONITORING REQUIREMENTS

Appendix 3 lists the permit limitations and monitoring requirements as defined in the previous permit.

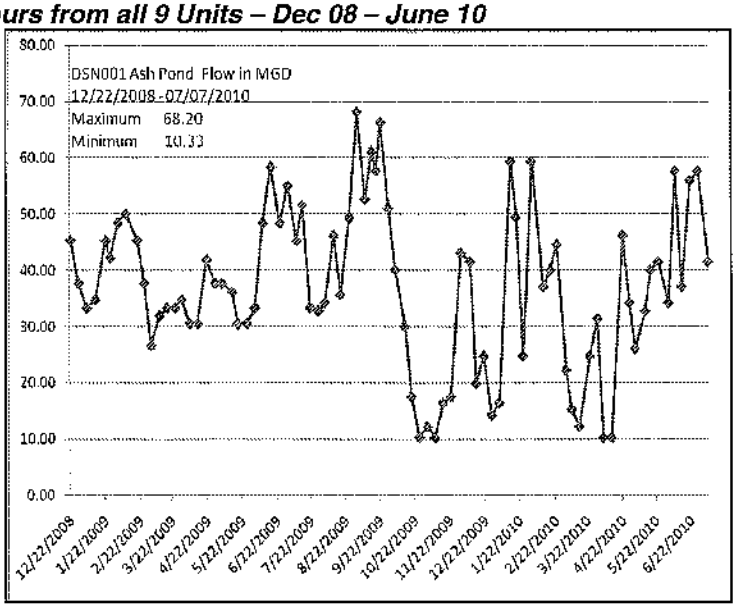
VI. HISTORICAL MONITORING AND INSPECTION

During the previous permit term, TVA - Kingston Fossil Plant complied with effluent limitations as outlined in the previous permit. A summary of the data reported during 2003-09 on Discharge Monitoring Report forms during the previous permit term is summarized in Appendix 4.

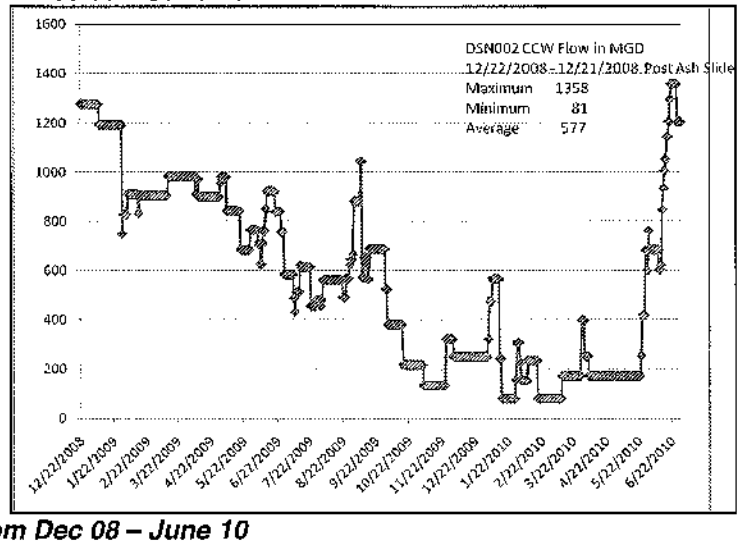
Data is provided below for the period 2003-08 to depict discharge conditions prior to the December 2008 ash spill, with further data for 2009 through June 2010 to depict conditions following the ash spill. To understand these historical data on flow and effluent concentration, KIF operations from Jan. 2009 to June 10 are shown below, depicting periods of power demand-related reduction or shutdown.



KIF total operating hours from all 9 Units – Dec 08 – June 10



Outfall 001 - Flow from Dec 08 – June 10



Outfall 002 - Flow from Dec 08 – June 10

VII. NEW PERMIT LIMITS AND MONITORING REQUIREMENTS

A. GENERAL

The proposed new permit limits have been selected by determining a technology-based limit and evaluating if that limit protects the water quality of the receiving stream. If the technology-based limit would cause violations of water quality, the water quality-based limit is chosen. The technology-based limit is determined from EPA effluent limitations guidelines if applicable (see Part IV); or from State of Tennessee maximum effluent limits for effluent limited segments per Rule 1200-4-5-.03(2); or by way of operational and/or treatability data. Furthermore, effluent limitations in this permit must comply with any approved Total Maximum Daily Load (TMDL) studies. Appendix 5 lists all proposed effluent limitations and monitoring requirements to be included in the new permit.

B. OPERATIONAL CHANGES AND ASH RECOVERY DURING THIS PERMIT TERM

During this permit term 2010-13, discharges through the ash pond to Outfall 001 will likely vary considerably. This variability can be described in these situations:

Situation 1: Routine plant operations with no dredging flow from ash recovery.
Rate of flow, based on above information, is approximately 40 MGD at Outfall 001 and 1300 MGD for Outfall 002.

Situation 2: Routine plant operations with variable dredging flow from embayment.
Outfall 001 flow varies 50-60 MGD and Outfall 002 from 1200 - 1350 MGD.

Situation 3: Reduced plant flows during shutdown and variable dredging flow from ash recovery.
Outfall 001 flow varies 8-30 MGD and Outfall 002 from 200-250 MGD

Situation 4: Reduced plant flows following dry ash conversion and gypsum dewatering and no dredging flow upon completion of ash recovery.
Outfall 001 varies from 1 to 8 MGD and Outfall 002 from 1200-1300 MGD.

In Situations 1 to 3, the **permit limits will apply** to the blended CERCLA and plant operating discharges, likely to extend through this permit term. Since the proposed permit limits are concentration-based, the variability of effluent flow will not represent a problem for monitoring and reporting.

During this period of almost continuous change, the importance of current information from both CERCLA and KIF Plant operations cannot be understated. Notifications required under permit provisions of Part II.B.1. "Changes Affecting the Permit" and progress updates for ash pond closure are especially important during the progress of ash recovery toward completion and plant operational changes. With these data, TVA can maintain a current picture of compliance.

C. PERMIT LIMITS-OUTFALL 001

Outfall 001 consists primarily of sluice waters from fly ash and bottom ash, dredging effluent from ash recovery project in the Swan Pond embayment and closure activities, and miscellaneous process and cooling waters. Outfall 001 discharges into the plant intake channel for eventual mixing with cooling water discharged through Outfall 002. Because no further treatment is provided during the cooling process, Outfall 001 pollutants are discharged essentially unchanged through Outfall 002.

1. Ash Pond Closure Plan

The permittee shall submit an Ash Pond Closure Plan describing the steps to be taken to prevent contamination of surface waters from the inactive site. As noted above, TVA has submitted a Remedial Action Work Plan under CERCLA for the Kingston Ash Recover Project. [18] For purposes of this permit, this plan will suffice to meet this requirement. Further, as noted in Part III of the permit, the permittee shall submit updates regarding elimination of ash pond discharge and closure actions following conversion from wet ash to dry ash handling.

2. Oil & Grease and Total Suspended Solids (TSS)

Effluent Limits and monthly monitoring are retained from the previous permit as follows:

Parameter	Daily Maximum, mg/l	Monthly Average, mg/l
Oil and Grease	19.4	14.4
TSS	92	29.9

3. pH

A pH range limit of 6.0 to 9.0 will be retained for the discharge from Outfall 001. This ensures the protection of water quality per certain Tennessee water quality criteria and, likewise, follow the federal guidelines promulgated by the EPA in 40 CFR §423.12(b)(1) which states "The pH of all discharges, except for once through cooling water, shall be in the range of 6.0 to 9.0."

The pH monitoring frequency at Outfall 001 will be retained from the previous permit at once per week, and collected by a grab sample.

4. Ash Pond Discharge of Metals

40 CFR, §122.44(d)(1)(iii) states that effluent limits must be specified for an individual pollutant when it is determined that "a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the allowable ambient concentration of a State numeric criteria within a State water quality standard for an individual pollutant". The permit application indicates that a number of metals are believed to be present in the ash pond discharge. For each of these metals a comparison was made of the effluent concentration as reported on DMRs and the permit application, with calculated limits based on State of Tennessee water quality criteria (see Reasonable Potential Analysis table below).

Spreadsheet calculations are shown below utilizing the procedures described earlier for determining water quality-based effluent limits. Specific factors used in these calculations include:

- stream background concentrations from the TVA permit application reported values from KIF intake monitoring,
- TDEC ambient monitoring data, and
- hardness value of 145 mg/l from the TDEC upstream ambient monitoring station at Clinch River mile 10.
- Effluent metals concentrations in permit application and reported by recovery project.

These data illustrate the reported effluent concentrations are lower than calculated effluent concentrations necessary to protect water quality in the Clinch River downstream of Outfall 001.

Thallium: Note that the table displays "minus" values for Calculated Effluent Concentrations necessary to meet instream Fish and Aquatic Life criteria. This is due to the background thallium concentration, a naturally occurring compound, greater than the WQC. Accordingly, no thallium permit limit is established; routine effluent monitoring is included.

[18] See Note 5.

5. REASONABLE POTENTIAL ANALYSIS – OUTFALL 001

WATER QUALITY BASED EFFLUENT CALCULATIONS OUTFALL 001

Hardness data: 145 mg/l
Clinch RM 4.5
TDEC Ambient Sta.

Stream (1Q10)	Stream (30Q5)	Waste Flow 3	Ttl. Susp. Solids	Hardness as CaCO3	Stream Allocation
[MGD]	[MGD]	[MGD]	[mg/l]	[mg/l]	[%]
155.8	155.8	36.12	9	145	50

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
	Stream Bckgrnd.	Fish/Aqua. Life WQ Criteria		Effluent Fraction	Fish & Aquatic Life WQ Criteria (1Q10)				Human Health Water Quality Criteria (30Q5)						Outfall 001
					In-Stream Allowable		Calc. Effluent Conc'n		In-Stream Criteria			Calc. Effluent Concentration			
EFFLUENT CHARACTERISTIC	Conc.[2]	Chronic	Acute	Dissolved	Chronic	Acute	Chronic	Acute	Organisms	Water/Organisms	DWS	Organisms	Water/Organisms	DWS	Average Conc'n [3]
	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	ug/l
Aluminum	390	--	--		--	--	--	--	--	--	--	--	--	--	829
Antimony	1	--	--		--	--	--	--	5.6	5.6	6.0	13	13	14	4.0
Arsenic	1	150	340		150	340	396	901	10.0	10.0	10.0	24	24	24	23.0
Barium	42	--	--		--	--	--	--	--	--	2000	--	--	5223	91.8
Beryllium	1	--	--		--	--	--	--	--	--	4.0	--	--	8	0.6
Boron	200	--	--		--	--	--	--	--	--	--	--	--	--	331.4
Cadmium *	0.3	0.318	2.88	0.194	1.64	14.85	4	39	--	--	5.0	--	--	13	<1
Calcium		--	--		--	--	--	--	--	--	--	--	--	--	23079
Chromium III *	1	100.5	772.4	0.084	1194	9177	3169	24380	--	--	100.0	--	--	264	1.53
Chromium IV *		11	16		11.00	16.00	29	43	--	--	--	--	--		
Cobalt	5.5	--	--		--	--	--	--	--	--	--	--	--	--	0.67
Copper *	1.15	12.30	19.07	0.220	56.0	86.8	146	228	--	--	--	--	--	--	1.93
Iron	255	--	--		--	--	--	--	--	--	--	--	--	--	220
Lead *	1.0	3.76	96.55	0.152	24.72	634	64	1683	--	--	5.0	--	--	11	0.8
Magnesium	10450	--	--		--	--	--	--	--	--	--	--	--	--	3723
Manganese	44	50	100	1.0	50.00	100	38	171	--	50	100	--	37.9	171	64
Mercury, (T) [1]	0.005	0.770	1.4		0.77	1.40	2	4	0.051	0.050	2.0	0.1	0.1	5	0.033
Molybdenum	13	--	--		--	--	--	--	--	--	--	--	--	--	34.2
Nickel *	5.5	71.2	641.2	0.210	339	3054	889	8101	4600	610	100	12209	1609	254	1.53
Selenium	1.0	5	20	1.0	5	20	11	51	--	--	50.0	--	--	131	4.77
Silver *	0.3	--	6.095	1.0	--	6.09	--	16	--	--	--	--	--	--	<1
Sodium		--	--		--	--	--	--	--	--	--	--	--	--	3176
Thallium	1.5	--	--		--	--	--	--	0.47	0.24	2.0	-2.0	-2.6	2	0.557
Tin	43	--	--		--	--	--	--	--	--	--	--	--	--	
Titanium	8.75	--	--		--	--	--	--	--	--	--	--	--	--	
Vanadium		--	--		--	--	--	--	--	--	--	--	--	--	24.0
Yttrium		--	--		--	--	--	--	--	--	--	--	--	--	
Zinc *	11	161.85	160.54	0.13	1256.74	1246.54	3315	3288	--	--	--	--	--	--	12.7
Cyanide (T)		5.2	22.0	1.0	5.2	22.0	14	58	140.0	140.0	200.0	372	372	NA	NA
Chlorine (T. Res.)		11.0	19.0	1.0	11.0	19.0	58	101	--	--	--	--	--	--	NA

NA = not applicable.

* Denotes metals for which Fish & Aquatic Life Criteria are expressed as a function of total hardness. The Fish & Aquatic Life criteria for this metal are in the dissolved form at laboratory conditions. allowable criteria and calculated effluent concentrations are in the total recoverable form.

1 A background level of 0.002 ug/L from February 2010 laboratory analyses. The chronic criterio for mercury is not converted to dissolved, as it addresses bioaccumulation rather than toxicity.

2 Stream background concentrations are taken from intake sample on the permit application, except for manganese, which is TDEC ambient data at RM 10.0.

3 Waste Flow & Effluent concentrations from Outfall 001 reported by Ash Recovery Project for 2009-2010.

As discussed above in Section IV, Applicable Effluent Guidelines, the establishment of numeric effluent limits for metals is infeasible. The Permit requires monthly monitoring at Outfall 001 of toxic metals discharged from the ash pond and Best Management Practices for future management. Detailed discussion of metal limits is enclosed in the Best Professional Judgment Analysis contained in this Rationale.

6. Mercury

Monitoring at Outfall 001 for Total Mercury and methyl mercury will be reported in order to track all mercury discharges into this segment of the Clinch River which is impaired for mercury. Analyses of total mercury will use either EPA Method 245.7 or Method 1631 and methyl mercury using Method 1630.

Monitoring frequency for total mercury will be monthly for twelve months on a grab sample. Monitoring for methyl mercury will be performed quarterly on a grab sample. Monitoring will continue for one (1) year at which time the frequency of mercury monitoring will be reevaluated.

7. Free Water Volume

The permit requirement for maintaining adequate capacity in the ash pond for settling has been retained since the 1995 permit, based on the 1985 EPA memorandum[19]. Data on Free Water volume are reported annually. During this permit term, the process for ash handling will be reviewed and revised with eventual filling and closure of the ash pond. Effluent limits for Total Suspended Solids will remain in effect:

Daily Maximum, mg/l	92 mg/l
Monthly Average	29.9 mg/l

Accordingly, the free water volume reporting requirement is deleted from the renewed permit. Permit requirement in Part III for Dike Inspections includes a quarterly updates of changes.

8. Ammonia, Nitrogen Total

Selective Catalytic Reduction (SCR) equipment is used at KIF in order to lower nitrogen oxide stack emissions, as mandated by the Tennessee Air Quality Board. SCR involves ammonia (and natural gas) injected into the boiler to remove NOx from the air waste stream. Effluent concentrations of ammonia nitrogen shown below indicate compliance since 2003 with the permit condition for net ammonia concentration of 2.85 mg/l.

The potential exists for effluent discharged from Outfall 001 to contain increased amounts of ammonia nitrogen. From effluent data supplied by TVA from 2003-10, worst case concentrations of ammonia introduced from NOx-control technology are expected to be approximately 1.5 mg/L, assuming no biological uptake. Although such discharge will not cause a measurable increase of ammonia concentration in the receiving stream, the proposed permit will incorporate monitoring at Outfall 001.

Monitoring, on a report basis, will include plant intake and effluent from Outfall 001. A net discharge will also be calculated and reported. In addition, the installation of diffusers for Outfall 001 was installed during the previous permit period. If a calculated value for net addition of ammonia as nitrogen exceeds an action concentration value of 1.5 mg/L, the permittee should investigate source(s) of ammonia, and proceed with a corrective action(s), if necessary. Furthermore, EAC -Knoxville shall be notified within 24 hours from the time the permittee receives

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[19] USEPA, "*Memorandum: Guidance for NPDES Permits issued to Steam Electric Power Plants, Rebecca Hanmer, 22 August 1985.*

results indicating that an action value of 1.5 mg/L was exceeded. Monitoring will be performed on a monthly basis, using grab samples.

D. PERMIT LIMITS - OUTFALL 002

The effluent discharged through Outfall 002 is primarily composed of "once through cooling water" from the main condensers (approximately 1296.6 MGD), which is subject to the effluent limitations guidelines contained in §423.12(b)(6) and §423.13(b).

1. COMPLIANCE WITH SECTION 316, CLEAN WATER ACT

a. 316(a) Potential Thermal Effects on a Balanced Indigenous Population of Aquatic Life

Thermal discharges are a concern for potential effects on a balanced and indigenous population of fish and other aquatic organisms at this location. TVA's extensive studies to date will be further expanded under EPA's guidance during this permit cycle. EPA Region IV has indicated that additional aquatic data should be collected during the five-year duration of the subject permit to facilitate the Section 316(a) determination in the "next NPDES permit." (Permit III.L.) The renewed permit retains the alternative thermal limit as existing data demonstrate the maintenance of a balanced indigenous population ("BIP") in the receiving waterbody. TVA will be required to submit a study plan outlining proposed assessments to support continuance of the ATL. The plan will be designed to supplement existing information previously provided by TVA. EPA has agreed to this approach and will participate in the review of the plan and the resulting data.

Section 316(a) of the Clean Water Act allows point-source discharges of heated water to exceed State water quality thermal criteria based on demonstrating maintenance of "Balanced Indigenous Populations" (BIP) of aquatic life. Kingston Fossil is operating under a 316(a) alternate thermal variance that has been administratively continued with each permit renewal based on studies conducted in the mid 1970's. The requirement for conducting 316(a) studies in TN comes from EPA Region IV guidance to the States requiring future variance requests be granted on new data generated to show aquatic communities meet the BIP standard.

In 2001, TDEC approved the TVA program for Reservoir Fish Assemblies Index (RFAI) studies to support the continuation of thermal variances. RFAI data is collected at upstream and downstream stations in Watts Bar Lake on the Clinch River every two years. With the application, TVA submitted data from 2001, 03, and 05 supporting their request for continuation of the 316(a) variance from the previous permit. **For this permit cycle, the RFAI data compiled by TVA upstream and downstream of KIF demonstrate that a balanced indigenous population is being maintained in the receiving water body.**

With the permit renewal application of December 2007, TVA described ecological conditions near Kingston Fossil Plant as monitored at three locations under their Vital Signs (VS) program. In addition to the fish community, environmental indicators are measured in the VS program for dissolved oxygen, chlorophyll, sediment quality, and benthic macro-invertebrate community.

Extensive interagency discussions between TVA, TDEC, and EPA Region 4 have occurred regarding future studies to demonstrate BIP. EPA Region 4 has requested additional information prior to their approval of TDEC renewal of any NPDES permits for fossil plants, in order to evaluate the thermal component and protection and propagation of a BIP. EPA and TVA have agreed to revise the existing TVA process for reservoir monitoring in accordance with the following terms:

Within 60 days of the permit effective date, the permittee shall prepare and submit for review by the Division a study plan which outlines how the permittee will conduct assessments that will generate information sufficient to support a determination of whether the Kingston Plant's alternative thermal limit under Section 316(a) can be continued in its next NPDES permit. The proposed study plan shall be designed to supplement information previously provided by the permittee. The permittee shall implement provisions of the plan within 60 days of its approval by the Division.

In the renewed permit, TDEC will extend the thermal variance, with the condition that TVA will revise the reservoir monitoring approach acceptable to TDEC and EPA Region 4.

b. Cooling Water Intake Structure-316(b)

316(b) limitations for this facility are determined to be in compliance based on best professional judgment in accordance with 40 CFR 401.14 and 122.43. This permit may be reopened to address compliance with 316(b) requirements upon issuance of a new rule or final guidance by EPA.

This permit, TN0005410, had been previously issued by EPA under the federal NPDES permit program. In those previous permits the facility was deemed to be in compliance with the Clean Water Act Regulations, Establishing Requirements for Cooling Water Intake Structures at Phase II Existing Facilities. This regulation is also referred to as the "316(b) rule". Previous and current compliance with the rule have been and continue to be based on best professional judgment (BPJ) in accordance with Title 40 CFR 401.14 and 122.43.

In 2007, during review of the draft permit addressing TVA's request for permit modification of the 316(b) language, EPA Region 4 suggested the division add language to the rationale of the permit to better detail the events supporting this modification. As it is still relevant to this permit renewal, we have included background information regarding the 2007 recent Court actions relating to the 316(b) rule:

On February 16, 2004, EPA took final action on regulations governing cooling water intake structures at certain existing power producing facilities under section 316(b) of the Clean Water Act (Phase II rule). 69 FR 41576 (July 9, 2004). The final Phase II rule applies to existing facilities that are point sources that, as their primary activity, both generate and transmit electric power or generate electric power for sale to another entity for transmission; use or propose to use cooling water intake structures with a total design intake flow of 50 MGD or more to withdraw cooling water from waters of the United States; and use at least 25 percent of the water withdrawn exclusively for cooling purposes (see 40 CFR 125.91).

Under the Phase II rule, EPA established performance standards for the reduction of impingement mortality and entrainment (see 40 CFR 125.94). The performance standards consist of ranges of reductions in impingement mortality and/or entrainment. These performance standards were determined to reflect the Best Technology Available (BTA) for minimizing adverse environmental impacts at facilities covered by the Phase II rule.

These regulations were challenged by industry and environmental stakeholders. On judicial review, the Second Circuit decision (Riverkeeper, Inc. v. EPA, 475 F.3d 83, (2d Cir., 2007)) remanded several provisions of the Phase II rule on various grounds. The provisions remanded to EPA include:

- *EPA's determination of the BTA under section 316(b);*
- *The rule's performance standard ranges;*
- *The cost-cost and cost-benefit compliance alternatives;*
- *The Technology Installation and Operation Plan provision;*
- *The restoration provision; and*
- *The ``independent supplier'' provision.*

With several significant provisions of the Phase II rule affected by the decision, and with the need to provide timely direction to Stakeholders about the continuing application of the Phase II rule, EPA's Assistant Administrator for Water issued a memorandum on March 20, 2007, which announced EPA's intention to suspend the Phase II rule. This memorandum also discussed the anticipated issuance of [this] Federal Register suspension document.

The formal suspension of the rule was published in the Federal Register: July 9, 2007 (Volume 72, Number 130)][Rules and Regulations][Page 37107-37109], and is available from the Federal Register Online via GPO Access [wais.access.gpo.gov][DOCID:fr09jy07-3].

Upon notice of the suspension of this rule, TVA requested to modify and remove only the suspended 316(b) requirements previously issued in this and seven (7) other TVA NPDES permits. The division agreed with the TVA request and modified only those requirements specifically suspended by the EPA, specifically the CDS report. All other permit requirements remained in place as enforceable compliance items as previously permitted and were deemed to remain in compliance with the remainder of the Clean Water Act based on BTA and best professional judgment (BPJ). **In January, 2008, TVA submitted biological monitoring data collected in accordance with the permittee's Proposal for Information Collection (PIC) plan as developed under the 316(b) requirements prior to their suspension by EPA on March 20, 2007. This and other information will be used to support evaluation of Best Technology Available during permit reissuance in subsequent years.**

2. BIOMONITORING REQUIREMENTS, CHRONIC

Based on the dilution factor and receiving stream flow for mixing, there is a concern for toxicity effects of the discharge on the receiving stream. Biomonitoring will provide information relative to the toxicity of the discharge. Calculation of toxicity limits is as follows:

$$DF = \frac{Qs}{Qw} = \text{Dilution Factor}$$

where **Qw** is a wastewater flow (Qw = 1296.6 MGD) and **Qs** is a receiving stream low flow (1Q10 = 155.8 MGD). Please refer to Appendix 1 for details regarding facility discharge and receiving stream. Therefore,

$$DF = \frac{155.8}{1296.6} = 0.12$$

Since the calculated dilution factor is less than 100:1, and assuming immediate and complete mixing, protection of the stream from chronic effects requires:

$$IWC \leq 1.0 \times IC25; \text{ or,}$$

INHIBITION CONCENTRATION, 25% ≥ IWC

Where IWC is Instream Waste Concentration and is calculated using the following formula:

$$IWC = \frac{Qw}{Qs} \times 100 = \text{Instream Waste Concentration}$$

$$IWC = \frac{1296.6}{155.8} \times 100 = 832 \text{ (i.e. 100\%)}$$

Therefore, WET testing will be required on 100% effluent. **The toxicity tests at Outfall 002 specified herein shall commence no later than 90 days from biocide application.** If no biocides are added, Outfall 002 discharges consist of raw river water to which no chemicals are added. Future requirements may be added as a Biocide / Chemical Treatment Plan (B/CTP) is developed. Details regarding biomonitoring methodology can be found in Part III of the permit.

Outfall 002 is comprised primarily of process wastewaters associated with the condenser cooling processes as outlined in Appendix 1. Storm water runoff from adjacent areas, the South Transformer Yard and Switchyard, are covered under the facility's TMSP Number TNR051787. From the table in Appendix 1, it can be determined that the total process waste flow is approximately 1296.627 MGD and the total of all flows is 1296.912 MGD. Accordingly, certain BPT/BAT effluent guidelines will be apportioned to the process flows and certain TN rules pursuant to Section 1200-4-5-.03 will be allocated to the nonprocess flows (see Appendix 5b). However, in this particular instance, Tennessee Water Quality Standards are more stringent than those promulgated by CFR guidelines. Consequently, the results of these water quality calculations are tabulated in Appendix 5c and are further referenced in more detail in the following discussion of Total Residual Oxidants.

3. TOTAL RESIDUAL OXIDANTS

KIF no longer uses chlorine for biocide control of OTCW, but uses bromine or other oxidizers. Biocide addition does not occur routinely, in fact DMR reports for 2008-9 show that no biocides were employed. Monitoring is required in the final permit at Outfall 002 per the parameter Total Residual Oxidants to measure these oxidizing compounds in a technique similar to chlorine. Permit limitations for use of these oxidizers are equivalent to those for the use of chlorine.

Permit limitations on the discharge of chlorine related pollutants are provided for "Total Residual Oxidants" (TRO) rather than "Total Residual Chlorine" in accordance with 40 CFR §423.11(a). Additionally, since TRO analysis methodology is not included in 40 CFR §136, for the purpose of this permit TRO measurements shall be made using the amperometric titration, DPD colorimetric, or specific ion electrode method for total residual chlorine as defined in 40 CFR §136.

In calculating the total residual oxidant limitations promulgated in this permit, the division considered the estimated stream low flows as well as the estimates of flow conditions under various "unit" operations. For the purpose of this permit, the division has assumed that the minimum operating conditions at this facility would reflect the operation of 1 unit running full open at 187 MGD (being treated accordingly), 2 similar units (187 MGD each) being operated at 50% of capacity, 4 of the smaller units (140 MGD each) being operated at 50% of capacity, and 2 smaller units (140 MGD each) being held in reserve. The calculation of this minimum operating volume is as follows:

Minimum flow = (187 MGD) + 0.50 x (187 MGD x 2) + 0.50 x (140 MGD x 4) = 654 MGD

In light of the recirculating flow conditions which this facility was designed to operate under, and the fact that the estimated low flow conditions in-stream of 155.8 MGD are substantially lower than the 654 MGD necessary to maintain minimum operating conditions, the division has decided to forego any attempts to reconcile the low flow conditions of the receiving stream with the minimum water volume necessary to sustain the operations at the facility. For this reason, the division is assuming that during periods when the facility is operating during minimum capacity, and under low flow conditions, the volume of water necessary to continue operations in a recirculating system is equal to 654 MGD. Furthermore, since only 187 MGD, or 1 unit, will be allowed to be treated at one time, a dilution factor of 654 to 187, or 3.5 to 1, will be used in determining the total residual oxidant concentration allowable in the discharge from Outfall 002. Appendix 2 shows that the BAT required discharge concentration for total residual oxidant (as Chlorine) is 0.2 mg/l, and is, therefore, less stringent than the water quality based calculations using the 3.5 to 1 dilution factor and EPA in-stream concentrations of 0.011 mg/l and 0.019 mg/l for the monthly average and daily maximum, respectively. Consequently, water quality is determinative of the total residual oxidant limits in this new permit (See Appendix 5d). However, these new limits will only be in effect so long as the total flow from Outfall 002 is equal to or exceeds 654 MGD. Should the discharge be less than this figure, the permittee will be required to meet total residual oxidant limits of 0.011 mg/l and 0.019 mg/l for the monthly average and daily maximum concentrations, respectively.

E. PERMIT LIMITS - INTERNAL MONITORING POINT 02A – FLUE GAS DESULFURIZATION (FGD)

Internal Monitoring Point 02A consists of approximately 1 MGD discharge from a gypsum detention pond into plant discharge channel which has a flow of approx. 1297 mgd. Effluent limits from NPDES Permit TN0080870 are incorporated into this permit, and are shown below.

The FGD operation is classified under SIC code 4911, "Electric, Gas, and Sanitary Services", "Electric Services" subcategory. Best Practicable Control Technology (BPT) and Best Available Technology Economically Achievable (BAT) limitations for several effluent characteristics are given in sections §423.12 and §423.13 respectively for low volume waste sources. Low volume waste sources are defined in §423.11(b) as "...*wastewater from all sources except those for which specific limitations are otherwise established...*".

Consequently, 40 CFR Part 423, "Steam Electric Power Generating Point Source Category" effluent guidelines are applicable to the process wastewater discharges from Internal Monitoring Point 02A. The table below lists the various BPT and BAT effluent guidelines applicable to this waste stream:

40 CFR PART 423 EFFLUENT LIMITATION GUIDELINES
STEAM ELECTRIC POWER GENERATING POINT SOURCE CATEGORY

EFFLUENT CHARACTERISTIC	Low Volume Waste Sources			
	§423.12(b)(3) - BPT		§423.13 - BAT	
	Average of Daily Values for 30 Consecutive Days	Maximum for Any 1 Day	Average of Daily Values for 30 Consecutive Days	Maximum for Any 1 Day
	[mg/l]	[mg/l]	[mg/l]	[mg/l]
TSS	30.0	100.0	--	--
Oil & Grease	15.0	20.0	--	--
pH	6.0 - 9.0	6.0 - 9.0	--	--

Note: 1. The quantity of pollutants discharged shall not exceed the quantity determined by by multiplying the flow of low volume waste sources times the concentration listed. At the permitting authority's discretion, the quantity of pollutant allowed to be discharged may be expressed as a concentration limitation instead of the mass based limitations specified. Concentration limitations shall be those specified above.

2. There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.

PERMIT LIMITS

OUTFALL 02A

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY			
	AVG. CONC. (mg/l)	AVG. AMNT. (lb/day)	MAX. CONC. (mg/l)	MAX. AMNT. (lb/day)	MSRMNT. FRQNCY.	SAMPLE TYPE***
FLOW	Report (MGD) *		Report (MGD) *		1/Week	Calculated
pH**	Range 6.0 - 9.0				1/Week	Grab
TOTAL SUSPENDED SOLIDS (TSS)	30	--	100	--	1/Week	Grab
OIL & GREASE	15	--	20	--	1/Week	Grab
TOTAL MERCURY	Report	--	Report	--	Quarterly	Grab
METHYL MERCURY	Report	--	Report	--	Quarterly	Grab
ARSENIC	Report	--	Report	--	Monthly	Grab
CADMIUM	Report	--	Report	--	Monthly	Grab
COPPER	Report	--	Report	--	Monthly	Grab
LEAD	Report	--	Report	--	Monthly	Grab
NICKEL	Report	--	Report	--	Monthly	Grab
SELENIUM	Report	--	Report	--	Monthly	Grab
THALLIUM	Report	--	Report	--	Monthly	Grab
ZINC	Report	--	Report	--	Monthly	Grab

* Flow shall be reported in Million Gallons per Day (MGD).
** pH analyses shall be performed within fifteen (15) minutes of sample collection.
*** Grab samples will be used at the time of pumped discharge from the detention pond.

a. Submission of Form 2C data

Since permit application for NPDES Permit TN0080870 only submitted estimated data (for the proposed FGD operation at that time, the permittee must, within two years after beginning to discharge from the proposed facility, complete and submit Items V and VI of NPDES application Form 2C (EPA Form 3510-2C). It is not necessary to complete those portions of Item V requiring tests which are already performed under the discharge monitoring requirements of this NPDES permit.

b. Monitoring to address Mercury Impairment

As stated in NPDES Permit TN0080870, monitoring will be performed quarterly for total and methyl mercury to define actual pollutant loading. TDEC is requiring mercury monitoring for one year to evaluate discharge concentrations during the plant startup. In addition, the permit directs TVA to provide a full characterization of the effluent of the effluent within two (2) years. Only after obtaining these data, water column data in the Clinch River, and additional fish tissue data can an evaluation of the potential contribution from the FGD process be performed.

TDEC rules require adequate opportunity for public comment regarding any future decisions on mercury monitoring and changes to the permit limitations.

F. OUTFALLS 006, 007, AND 008

Outfalls 006, 007, and 008 convey comparatively minor waste streams: Non-contact Cooling Water (no additives used), North Parking Area Drainage and Abandoned Ash Pond Area Seepage (F15) and Drainage from Sluice Line Trench, including Precipitation and Intermittent discharge from ruptured ash sluice line. All three outfalls are discharging into the facility's intake channel. The combined flow from all three discharges is 0.288 MGD, which constitutes approximately 0.02% of the total flow used for cooling and other purposes at the facility. Consequently, there will be no numeric effluent limitations or specific monitoring requirements established for discharges from Outfalls 006, 007 and 008.

IX ANTIDEGRADATION

Tennessee's Antidegradation Statement is found in the Rules of the Tennessee Department of Environment and Conservation, Chapter 1200-4-3-.06. It is the purpose of Tennessee's standards to fully protect existing uses of all surface waters as established under the Act.

Stream determinations for this permit action are associated with the waterbody segment identified by the division as segment ID#:TN06010201001_0100. The division has made a water quality assessment of the receiving waters associated with the subject discharge(s) and has found the receiving stream to be neither an exceptional nor outstanding national resource water.

Unavailable Conditions Waters (assessed as needing additional pollution controls)

Additionally, this portion of the Clinch River does not fully support designated recreational uses due to elevated concentrations in fish tissue of PCBs, mercury, and chlordane. The new discharge from this facility does not likely contain significant amounts of these effluent characteristics but the Division has included monitoring provisions for confirmation. The division, therefore, considers the potential for degradation to the receiving stream from these discharges to be negligible.

X. PERMIT DURATION

The proposed limitations meet the requirements of Section 301(b)(2)(A), (C), (D), (E), and (F) of the Clean Water Act as amended. It is the intent of the division to organize the future issuance and expiration of this particular permit such that other permits located in the same watershed and group within the State of Tennessee will be set for issuance and expiration at the same time. In order to meet the target reissuance date for the Clinch-Lower watershed and following the directives for the Watershed Management Program initiated in January, 1996, the permit will be issued to expire in 2013.

XI. BEST PROFESSIONAL JUDGMENT ANALYSIS

Prepared by Robert Alexander

CONTENTS OF THIS ANALYSIS:

A. 1982 Steam Electric Power Effluent Limitations Guidelines
B. 2009 EPA Steam Electric Power GeneratinPoint Source Category: Final Detailed Study Report (EPA 821-R-09-008)
C. 2010 USEPA Rulemaking Process for ELGs for Coal-Fired Plants
D. USEPA MEMORANDUM – NPDES Permitting at Steam Electric Fossil Plants, dated 7 June 2010
E. TVA Proposed Conversion of Wet Ash Handling to Dry Storage
F. TDEC Procedures for Establishing Effluent Limits
G. Comments on other fossil plant Draft NPDES Permits
H. Conclusion - Permit Writer's Best Professional Judgment

A. 1982 STEAM ELECTRIC POWER EFFLUENT LIMITATIONS GUIDELINES (ELGS)

EPA first issued effluent guidelines for the Steam Electric Power Generating Point Source Category (i.e., the Steam Electric effluent guidelines) in 1974 with subsequent revisions in 1977 and 1982. Steam Electric effluent guidelines are codified at 40 CFR Part 423[20] and include limitations for the following waste streams (emphasis added):

- Once-through cooling water;
- Cooling tower blowdown;
- **Fly ash transport water;**
- **Bottom ash transport water;**
- Metal cleaning wastes;
- Coal pile runoff; and
- Low-volume waste sources, including but not limited to wastewaters from:
  - wet scrubber air pollution control systems [Flue Gas Desulfurization, or FGD systems],
  - ion exchange water treatment systems,
  - water treatment evaporator blowdown,
  - laboratory and sampling streams,
  - boiler blowdown,
  - floor drains,
  - cooling tower basin cleaning wastes, and
  - recirculating house service water systems (sanitary and air conditioning wastes are not included) [40 CFR 423.11(b)].

1982 EPA ELG Background Information:

[20] 47 Fed. Reg. 52290. November 19, 1982.

In the 1982 development document for ELGs, EPA addressed[21]:

- waste streams listed in the part 1 above, and the four factors known to affect effluent characteristics:
  - type of coal burned
  - combustion process used
  - plant site characteristics, and
  - intake water quality.
- Priority pollutants, mainly inorganics (metals)
- Treatment and control technologies used in the 1970's and early 1980's.

Regarding effluents from coal ash ponds, the significant points from the 1982 ELGs are:

- Numeric limitations were established for Total Suspended Solids (TSS), Oil and Grease (O&G), and pH.
- For fly ash transport water, no numeric limits for metals were established.
  - "EPA determined at proposal that the available data regarding the degree of toxic pollutant reduction to be achieved beyond the BPT were too limited to support national limitations."[22]
  - "The Agency considered requiring a zero discharge option for existing sources but rejected it because the high cost of retrofitting does not justify the additional pollutant reductions beyond BPT."[23]
    - The 1974 requirement for zero discharge of fly ash transport water was remanded in 1976.
  - "Many existing plants are achieving zero discharge [for fly ash sluice water] and new plants are at least as capable of implementing dry fly ash systems."[24]
- For bottom ash transport water, no numerical limits for metals were established.
  - "EPA did not propose BAT limitations for the priority pollutants.
  - Analysis of available wastewater sampling data did not indicate that a quantifiable reduction of toxic pollutants would be achieved beyond the BPT level of control."[25]
    - 1974 BAT contains the same TSS, O&G, pH and PCB limits as BPT, plus a recycle requirement of 12.5 cycles of bottom ash recycle water.
- For low volume wastes [i.e. FGD wastewater]., no numerical limits for metals were established.
  - In 1982, EPA examined whether to prescribe numerical limits for metals such as arsenic, mercury, selenium, etc., but declined to do so because these substances were determined to be "present in amounts too small to be effectively reduced by technologies known to the administrator." 47 Fed. Reg. 52,290, 52,303-04 (Nov. 19, 1982).

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[21] USEPA, *Development Document for Effluent Limitations Guidelines and Pretreatment Standards for the Steam Electric Point Source Category,* EPA-440/1-82/029, November 1982.
[22] *Id.* at page 496.
[23] *Id.* at page 495.
[24] *Id.* at page 497.
[25] *Id.* at page 498.

- Best Available Technologies (BAT) evaluated as capable of achieving limitations are not listed for Bottom Ash or Fly Ash sluice water or Low-Volume Wastes, as shown in Table II-1 below[26]:

Table II-1

TECHNOLOGIES EVALUATED AS CAPABLE OF ACHIEVING LIMITATIONS

Wastestreams	BAT: Existing Sources	Standards of Performance: New Sources	Pretreatment Standards: Existing Sources	Pretreatment Standards: New Sources
Once-Through Cooling Water	Chlorine Minimization-Dechlorination	Chlorine Minimization-Dechlorination		
Cooling Tower Blowdown	Use of alternative chemicals	Use of alternative chemicals/chemical precipitation	Use of alternative chemicals	Use of alternative chemicals
Bottom Ash Transport Water	?	Sedimentation		
Fly Ash Transport Water		Dry transport and disposal		Dry transport and disposal
Chemical Metal Cleaning Wastes	Chemical Precipitation	Chemical Precipitation	Chemical Precipitation	Chemical Precipitation
Non-chemical Cleaning Wastes	Reserved for future consideration	Reserved for future consideration	Reserved for future consideration	Reserved for future consideration
Low Volume Wastes (includes boiler blowdown)		Sedimentation	Sedimentation	Sedimentation

[26] *Id.* at page 7, Section II - Conclusions

- Treated Fly Ash Pond effluent concentrations of only five metals were compared with discharges from various industrial processes as shown below:

Treatment Process	Effluent Parameter (mg/l)				
	Arsenic	Copper	Nickel	Selenium	Zinc
Physical-Chemical by various industrial segments	0.02 to 0.1	0.1 to 7.8	0.09 to 1.9	0.02 to 0.08	0.1 to 6
ASH POND EFFLUENT					
Lime Softening	1	10 to 23	0.5 to 6	3 to 52	<2 to31
Lime-FeSO4	<1 to 3	7 to 23	2 to 10	3 to 32	<2 to 25

- For bottom ash discharges, no data is shown for effluent metals concentrations.

- Wet fly ash handling/disposal had higher estimated costs than dry fly ash handling for new plants in 1979 dollars.

SUMMARY OF 1982 ELGS

- ELGs cover pH, PCBs, Total Suspended Solids, and Oil and Grease.
- EPA considered setting numerical limits for metals, but found inadequate data from which to set such numerical limits for toxic metals and low volume wastes (including FGD wastewater).

B. 2009 EPA STUDY REPORT

In October 2009, EPA published a summary report with two purposes:

- To review discharges from steam electric facilities, and
- To determine whether ELGs should be revised.

The report focused primarily on ash ponds and wastewater from FGD air pollution controls. The report:

- Includes data on wastewater characteristics from coal fired power plants;
- Identifies the wastewater treatment technologies reviewed:
  - FGD wastewater treatment technologies
    - Settling ponds
    - Chemical precipitation (hydroxide and/or sulfide)
    - Biological treatment
    - Constructed wetlands
    - Vapor-compression evaporation
    - Zero discharge
  - Fly and bottom ash sluice water treatment
    - Settling ponds
    - Re-use of wastewater
- Presents an overview of the industry profile and predicted future trends in the use of air pollution controls; and

- Describes environmental impacts that have been linked to coal combustion wastewater.

EPA developed the study using 30 pre-selected plants with 9 owners and obtained data from existing sources and a questionaire, and site visits with EPA sampling. TVA plants at Widows Creek FGD system and Paradise, KY were included in the study.

Summary of Significant Points:

- FGD wastewater effluent concentrations identify toxic metals from three treatment technologies at the following facilities:
  - Settling pond at TVA Widows Creek, AL
  - Chemical precipitation at Tampa, FL; Homer City, PA; Mitchell, WV; and Belews Creek, NC.
  - Anoxic/Anaerobic biological treatment at Belews Ck, NC.

- Ash pond effluent concentrations identify toxic metals at:
  - Bottom ash pond – Homer City, PA;
    1. Combined bottom and fly ash pond – Widows Creek, AL
    2. Fly ash ponds – Mitchell, WV and Cardinal, OH

- Effluent metals data is presented as total metals and dissolved metals per EPA Method 200.8, low-level metals by various methods, and conventional parameters (COD, NH_3, Chlorides, HEM, TDS/TSS).[27]

- Case Studies are shown:
    1. Reuse of FGD wastewater in WV, OH, and NC
    2. Reuse of fly ash and bottom ash wastewater in KY and PA

- **EPA has determined the Study Report does not contain adequate data on treatment technologies and effluent concentrations to enable setting numerical effluent limits for toxic metals.**[28]

C. 2010 USEPA RULEMAKING PROCESS FOR ELGS FOR COAL-FIRED PLANTS

EPA is currently drafting revised ELGs for coal-fired plants and issued a proposed Information Collection Request (ICR) questionaire on March 9, 2010.[29]

- ICR was distributed in mid-2010 to selected fossil plants.
- Responses from fossil plants are due 90 days after receipt absent an extension.
- EPA analyses of the data will follow, with draft ELGs planned for 2012.
- Final ELGs are planned to be issued in 2014.

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[27] For example, See Table FGD-1 and AP-1 at end of document. For comparison, TVA effluent data is included in AP-1 later in this document.

[28] EPA Supporting Statement, Questionnaire, February 2010, pg 2-1 at , http://www.epa.gov/waterscience/guide/steam/supporta.pdf (TDEC has a paper copy of this document in the file, but the URL availability is solely under EPA's control)

[29] 75 FR 10791, March 9, 2010

For detailed information and to see the questionaire, see Fact Sheet: Request for Comment on Questionnaire for the Steam Electric Power Generating Effluent Guidelines (February 2010). A relevant excerpt is quoted below:

> "Approximately 734 fossil- or nuclear-fueled steam electric plants will be required to complete Parts A and I of the questionnaire. This total includes approximately 495 coal-fired, 9 petroleum coke-fired, 20 oil-fired, 168 gas-fired, 20 nuclear power plants, and 22 combination power plants. [...] One or more of these subpopulations will also be required to fill out certain additional detailed sections (for some sections of the questionnaire, the coal-fired respondents will be reduced to a subset of approximately 94 plants).
>
> EPA has determined that the data obtained through the Steam Electric ICR is necessary for EPA to review and revise the ELGs for the steam electric industry. The ICR will obtain information about steam electric power generating industry operations for use in characterizing waste streams and the processes that generate the wastes, environmental data, and the availability and affordability of technologies that may be used to reduce wastewater pollutant discharges associated with this industry. These data will be used to perform **detailed technical and economic analyses** that will support EPA's potential **development of numerical limitations** or best management practices for wastewaters generated by steam electric plants."[30] [emphasis added]

Key points of EPA Information Collection Request (ICR):

- At this writing, it is unclear whether or how much data will be available from TVA fossil plants depending on TVA plants being selected in the representative samples for detailed wastewater technology. All eleven of TVA's coal-fired electricity generating plants received the ICR questionaire.

- EPA will solicit data from ten coal plants having combined FGD/ash ponds for which EPA desires detailed data.

- EPA estimates that the total burden to the 393 coal-fired electric power plants for responding to the questionnaire will be approximately 200 hours per plant, for a total estimated effort of $4MM.

- Adequacy of Existing Data

  - EPA has concluded the 2009 Study lacks specific information to set ELGs:

    "EPA compiled certain information through a recently-completed study [2009 Study Report] of the steam electric power generating industry and through public sources of information, but was not able to obtain the detailed plant-level and generator-level data that will be collected through this questionnaire."[31]

  - Although a similar data collection under the Clean Air Act is ongoing, "it will not collect information about the wastewaters generated from this equipment, nor will it collect information regarding related operating practices that affect the wastewater pollutant characteristics and generation rate."

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[30] *See* EPA Supporting Statement; *supra* note 8 at 1-2.

[31] EPA Supporting Statement, Questionnaire, February 2010, pg 2-1 at , http://www.epa.gov/waterscience/guide/steam/supporta.pdf

- Cost Data

  - Data on costs of achieving effluent reduction are not available from existing data sources [including the 2009 Study]:

    "EPA determined that the information available for regulated utilities are generally not sufficiently detailed and complete to support the plant level economic/financial impact analyses that will be conducted for the effluent guidelines rulemaking."

  - Sources of cost data needed for ELG development include:

    - Federal Energy Regulatory Commission
    - USDOE Energy Information Administration
    - The Rural Utility Service (RUS)
    - Securities and Exchange Commission (SEC)
    - Edison Electric Institute (EEI)

  - Depending on the data requested, EPA asks for plants to provide cost information for systems installed since 1985 or 1990. Relatively few plants have installed treatment systems since then, therefore EPA has selected these dates to obtain the data necessary to evaluate potential technology options.

- Parts A thru D and I will be submitted to all coal-fired plants, with Parts E, F, and G submitted to selected facilities of interest.

D. USEPA MEMORANDUM – NPDES PERMITTING OF WASTEWATER DISCHARGES from Flue Gas Desulfurization (FGD) and Coal Combustion Residuals (CCR) Impoundments at Steam Electric Fossil Plants, dated 7 June 2010.

EPA Office of Wastewater Management issued this Memorandum to EPA Regions as interim guidance to assist permitting authorities in establishing permit requirements for steam electric plants, primarily for FGD discharges. At KIF, the CCR stream (i.e., sluiced fly and bottom ash) and the FGD discharges flow are currently treated in separate settling ponds. EPA's the guidance has been considered in this BPJ analysis.

E. TVA PROPOSED CONVERSION OF WET ASH HANDLING TO DRY STORAGE

TVA plans to eliminate all wet ash and gypsum storage in the TVA system and convert its 11 operating coal-fired power plants to dry storage. As stated in the Draft NPDES permit , the TVA Board decided in July 2009 to convert wet ash to dry ash handling.[32]

- Program Details (TN-only)

  - **Wet fly-ash** will be converted to dry storage at Allen, Gallatin, and Kingston.
  - **Wet bottom-ash** will be converted to dry storage at all eleven TVA fossil plants.
  - **Gypsum dewatering** processes will be installed at Bull Run and Kingston.

[32] http://www.tva.gov/news/kingston/dry_ash.pdf

- New **ash disposal** facilities will be developed to handle future plant operations.
- Eighteen existing ash and gypsum **ponds will be closed** and capped according to EPA guidelines for all of TVA area.
- High risk storage facilities will be converted first at Bull Run and Cumberland.
- TVA expects the conversion program to cost $1.5 to $2 billion and take 8-10 years to complete.
- Additional disposal facilities are planned for future plant operations.

o An 80% reduction of ash sluice water at KIF is proposed for dry fly ash handling, with the effluent flow from Outfall 001 dropping from 40.5 to 15.3 MGD.[33]

o Conversions Planned for Each TVA Fossil Plant:

- Allen (near Memphis, TN; 3 units; 990 MW)
  - Wet fly ash to dry storage
  - Wet bottom ash to dry storage
- Bull Run (near Oak Ridge, TN; 1 unit; 950 MW)
  - Gypsum dewatering
  - Wet bottom ash to dry storage
- Cumberland (northwest of Nashville, TN; 2 units; 2,600 MW)
  - Wet bottom ash to dry storage
- Gallatin (northeast of Nashville; 4 units; 1,255 MW)
  - Wet fly ash to dry storage
  - Wet bottom ash to dry storage
- John Sevier (near Rogersville, TN; 4 units; 800 MW)
  - Wet bottom ash to dry storage
- Johnsonville (near Waverly, TN; 10 units; 1,485 MW)
  - Wet fly ash to dry storage
  - Wet bottom ash to dry storage
- Kingston (near Kingston, TN; 9 units; 1,700 MW)
  - Wet fly ash to dry storage [Scheduled for completion in 2011]
  - Wet bottom ash to dry storage
  - Gypsum dewatering

F. COMMENTS ON THE DRAFT PERMIT(S)

The Draft NPDES Permit for the TVA Johnsonville and Bull Run Fossil Plants established effluent limits for parameters listed in the 1982 ELGs and previous permits: pH, Total Suspended Solids, and Oil and Grease. In addition, the draft permits required monitoring of toxic metals:

[33] TVA, *Finat Environmental Assessment, KINGSTON DRY FLY ASH CONVERSION, Roane County, Tennessee, March 2010,* pg 14 available at http://www.tva.gov/environment/reports/kif_dry_ash/FEA.pdf.

OUTFALL 001	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY			
EFFLUENT CHARACTERISTIC	AVG. CONC. (ug/L)	AVG. AMT. (lb/day)	MAX. CONC. (ug/L)	MAX. AMT. (lb/day)	MSRMNT. FRQNCY.	SAMPLE TYPE
Arsenic (T)	N/A	N/A	report	N/A	Monthly	Grab
Cadmium (T)	N/A	N/A	report	N/A	Monthly	Grab
Copper (T)	N/A	N/A	report	N/A	Monthly	Grab
Lead (T)	N/A	N/A	report	N/A	Monthly	Grab
Mercury (T)	N/A	N/A	report	N/A	Monthly	Grab
Nickel (T)	N/A	N/A	report	N/A	Monthly	Grab
Selenium (T)	N/A	N/A	report	N/A	Monthly	Grab
Thallium (T)	N/A	N/A	report	N/A	Monthly	Grab
Zinc (T)	N/A	N/A	report	N/A	Monthly	Grab

The renewed permit will add the following metals to the monitoring requirement – the permit will thus require monitoring for all metals which are listed in current TN Water Quality Criteria:

Antimony, Barium, Beryllium, Chromium, and Silver

Commenters on the draft permits have stated that TDEC must establish Technology-Based Effluent Limits for toxic metals:[34]

> "Where EPA has not yet promulgated ELGs for particular pollutants discharged by a given point source category, the CWA requires TDEC to stand in the shoes of EPA and use its best professional judgment ("BPJ") to set case-by-case TBELs for these pollutants in NPDES permits.
>
> In addition to the TBELs required at Outfall 001 and discussed above, commenters request that TDEC establish numeric effluent limits for the pollutants listed in the NPDES permit for Outfall 001, including aluminum, arsenic, cadmium, copper, iron, lead, mercury, nickel, selenium, silver, thallium, and cyanide. In addition, TDEC should require monitoring and effluent limits for the additional pollutants EPA identified in CCW wastewaters, including antimony, barium, beryllium, boron, calcium, chromium, cobalt, magnesium, manganese, molybdenum, tin, titanium, vanadium, yttrium, and zinc at Outfall 001 and 011.
>
> Using the wealth of data available from EPA and power plants in Tennessee, TDEC can and must use its best professional judgment to set BAT-based numeric effluent limits for heavy metals, such as the 27 pollutants listed above, present in CCW wastewaters."

This portion of the Rationale specifically addresses this comment. Responses to other comments received during the public review process are addressed separately.

[34] Environmental Integrity Project letter, dated March 16, 2010.

G. TDEC PROCEDURES TO DEVELOP ASH POND EFFLUENT LIMITS

1) OVERVIEW

TDEC rules require use of Best Professional Judgment (BPJ) when federal ELGs are not applicable:

For industrial discharges without applicable federal effluent guidelines, best professional judgment should be employed to determine appropriate effluent limitations and standards.[35]

Federal ELGs are both **existing and applicable** to waste streams in question. Nevertheless, TDEC must follow the procedure defined under 40 CFR 125.3 to impose Technology-based treatment requirements for discharges on a case-by-case basis, using BPJ:

Technology-based treatment requirements may be imposed through one of the following three methods: [...] On a case-by-case basis under section 402(a)(1) of the Act, to the extent that EPA-promulgated effluent limitation are inapplicable.[36]

Again, federal ELGs are both **existing and applicable** to waste streams in question. Under 40 CFR 125.3 and Section 402(a)(1) of the CWA, the permit writer must consider:

(1) the appropriate technology for the category class of point sources of which the applicant is a member, based on all available information, and
(2) any unique factors relating to the applicant.

2) POLLUTANTS ADDRESSED BY PUBLISHED EFFLUENT GUIDELINES

Prior to establishing BPJ-based limits for a pollutant not regulated in an effluent guideline, the permit writer should ensure that the pollutant was not considered by EPA while developing the ELGs. That is, BPJ-based effluent limits are not required for pollutants that were considered by EPA for regulation under the effluent guidelines, but for which EPA determined that no ELG was necessary.

In developing the 1982 ELGs, EPA considered but did not establish numeric ELG's for toxic metals due to lack of available data. In 2005, EPA after reviewing TRI and NPDES data, has decided to revisit ELGs from power plants. EPA is currently drafting revised ELGs for coal-fired plants and issued a proposed Information Collection Request (ICR) questionnaire on March 9, 2010. Responses to the ICR will be analyzed by EPA, with draft ELGs planned for 2012. Final ELGs are planned to be proposed in 2014.

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[35] TDEC, *Rules of TDEC, Div. of WPC, Chapter 1200-4-5, Permit Limitations and Standards,* Sec 1200-4-5-.01(1)(b)(2)
[36] 40 CFR 1325.3(c)(2)

3) SECTION 304(B) FACTORS TO BE CONSIDERED IN SETTING BPJ LIMITS[37]

Factor 1. Age of equipment and facilities involved

Kingston Fossil Plant (KIF) began operation in 1955 and, at the time it was finished, was the largest coal-burning power plant in the world, a distinction it held for more than a decade. KIF capacity is reported at 1700 megawatts burning up to 14000 tons of coal per day. The ash pond treats sluice water for fly ash and bottom ash with construction in 2010 of a separate gyspum wastewater pond from the Flue Gas Desulfurization system.

The development of the ash pond has progressed in stages from the initial construction of the ash pond within the impounded Watts Bar Lake in the early 1950's and continued with construction of the stilling pond in 1978. The ash pond is currently 92 acres in size and the stilling pond is 29 acres surface area.

KIF is expected to generage approximately 400-550,000 tons per year of ash, of which 80% is fly ash and 20% is bottom ash. Planning for conversion to dry ash handling will be performed during this permit term and all ash will be eventually transported offsite, according to TVA sources.

The age of KIF combustion equipment is a factor that may be affecting coal ash wastewater. However, data does not exist as to specific effects.

The age of the TVA ash pond impoundments is not a significant factor in examining effluent quality – newer or older impoundments can produce the same settling performance.

The age of ash transport equipment and process is very relevant – ash sluicing practices and equipment are unchanged for almost 50 years. During this permit term, it is likely that TVA will replace KIF equipment and processes with conversion to dry bottom ash handling and gypsum dewatering.

Although the 1982 ELGs established the dry fly ash technology under New Source Performance Standards (NSPS), this rule is not applicable to wet ash treatment process used at KIF. As noted in the EPA 2009 Study Report, development of future fly ash handling will be based on dry transport:

> *More plants in the combined data set operate wet bottom ash handling systems than wet fly ash handling systems. Fewer wet fly ash systems are expected because the NSPS promulgated in 1982 prohibit the discharge of wastewater pollutants from fly ash transport water. Not surprisingly, EPA has found that the steam electric units generating wet fly ash transport water tend to be older units, while dry ash handling systems tend to be operated on newer units.*[38]

[37] 40 CFR 125.3(d)
[38] EPA Steam Electric Power Generating Point Source Final Detailed Study Report, 2009, pg 5-2

Factor 2: Process employed

KIF ash disposal involves sluicing bottom ash into a 90-acre ash pond flowing into a stilling pond and discharge of final effluent to Watts Bar Lake at Clinch River mile 2.5. FGD scrubber wastewater is treated in a detention pond and is mixed with plant cooling water in the discharge channel. Fly ash originates from operation of electrostatic precipitators and is transported to the dry ash stacking area:

The type of process used at KIF or any fossil plant is a unique combination of factors which create wastewater characteristics specific to each plant. Dominant factors affecting coal ash wastewater are:

- type and mixture of coal burned,
- coal handling practices such as washing and pulverizing,
- intake water quality,
- type of boiler, and
- waste stream source (bottom ash, fly ash, gypsum, etc.)

Toxic metal constituents in coal ash are identified in the 1982 ELGs showing variations in coal ash composition based on anthracite, bituminous, subbutiminous, and lignite coal sources.[39]

For example, a description of fuel source at KIF is stated below:

> *KIF is currently burning a blend of eastern bituminous coal and PRB coal. The PRB coals contain less sulfur and more calcium than eastern bituminous coals. This could result in some of the wastewaters listed in Table 3-8 having a higher pH and more alkalinity than if only eastern bituminous coals were being burned. Bohac (1990) stated that "If the ash contains more equivalent leachable sulfur compounds than alkaline metal oxides, the ash sluice water would tend to have a depressed pH compared to the intake water prior t o the ash addition. If the alkaline metal oxides predominate, the sluice water would tend to have an elevated pH.".*[40]

Factor 3: Engineering aspects of application of various control techniques

Settling is the predominant control technologies for fly ash sluice water.

Table 5-6 shows that 95 percent of the plants in the combined data set that handle any amount of fly ash wet send the fly ash transport water to settling ponds. Sixty-five percent of the fly ash ponds from the combined data set receive both fly ash and bottom ash. Only one of the fly ash ponds included in the combined data set is completely segregated (i.e., it receives only fly ash wastewater). [41]

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[39] *See* USEPA, Development Documents, *supra* note 2 at 144.
[40] *TVA, Draft Environmental Assessment – Kingston Dry Fly Ash Conversion, Roane County, TN, March 2010, p. 21*
[41] USEPA, 2009 Final Study Report, *supra* note 24 at 5-11

The control technology for **bottom ash** sluice water involves dewatering bins, settling, or both.

> *The plants within EPA's combined data set that operate wet bottom ash handling systems send their bottom ash transport water to dewatering bins, settling ponds, or both. EPA has observed that most bottom ash settling ponds also receive other plant wastewaters. In response to the data request, no plants reported operating segregated bottom ash ponds. Table 5-7 shows that 90 percent of the plants in the combined data set that handle the bottom ash with a wet system transfer the bottom ash transport water to a settling pond for treatment. Only 18 percent of the plants are operating dewatering bins prior to the settling pond. As shown in Table 5-7, there are more plants that keep their bottom ash transport and fly ash transport waters segregated than not.*[42]

At KIF, wastewater treatment is performed in a 90-acre settling pond and 30-acre stilling pond for the combined flow from bottom ash processes, metal cleaning wastes, coal yard runoff, and other minor sources. FGD wastewater is treated in a separate settling pond. By their nature, settling ponds are designed for gravity separation of ash solids with discharge of supernatant to surface waters. While ash ponds are not designed to treat dissolved metals from sluiced ash or other wastewater sources, they are very effective in removing metals that are present in the waste stream in particulate form.

USING EFFLUENT DATA TO EVALUATE CONTROL TECHNOLOGY

Availability of effluent data on wastewater treatment performance for ash ponds is described in Section 2 above, describing EPA's national effort to revise ELGs. Pending completion in 2011-12 of EPA's data collection, two sources[43] are currently available to TDEC regarding effluent concentrations of toxic metals from ash ponds – (1) EPA's 2009 Study Report, and (2) Actual effluent data from TVA's operations.

EPA 2009 Study Report

The most representative data from the 2009 EPA Study Report are effluent metals concentrations from the combined ash settling pond at TVA Widows Creek - summarized in **Table 5-9** for:

aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, selenium, sodium, thallium, titanium, vanadium, yttrium, and zinc.

Table 5-9 is copied later in this document - note that this table does not include silver and tin.

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[42] Id., pg 5-12.

[43] As noted in the Rationale, data for concentrations of effluent metals will be available following issuance of the KIF permit – monthly analyses will begin in 2010.

TVA Ash Pond Effluent Data

TVA has provided effluent concentrations from KIF as shown on the following page. Data is presented from permit renewal applications submitted in 2002 and 2008 - each entry is based on analysis of one (1) sample.

Comparison of these data indicates a wide range of effluent concentrations. Concentrations of arsenic, for example, are described below:

- KIF permit application data ranges from 22 – 90 ug/l.
- EPA data ranges from Non-Detect at 10 ug/l to 150 ug/l per Table 5-9.
- EPA Ash Recovery project data ranges from 2.9 ug/l to 95 ug/l with a mean of 19.5 [44] for the KIF stilling pond discharge.

[44] Available at http://www.epakingstontva.com/Air%20and%20Water%20Data%20Summaries/July%202010%20Water%20Quality.pdf.

	Units are in µg/L	KIF 001					KIF Intake				
		Form 2C		Form 2C			Form 2C		Form 2C		
	Parameter	SYM	2002	SYM	2008	MEAN	SYM	2002	SYM	2008	MEAN
1	Aluminum		990		800	895		280		500	390
2	Antimony		7.3		2.2	4.75	<	1	<	1	1
3	Arsenic		90		22	56	<	1	<	1	1
4	Barium		450		380	415		43		41	42
5	Beryllium	<	1	<	1	1	<	1	<	1	1
6	Boron		300		450	375	<	200	<	200	200
7	Cadmium	<	0.1	<	0.5	0.3	<	0.1	<	0.5	0.3
8	Calcium		N/A		N/A			N/A		N/A	
9	Chromium		7		12	9.5	<	1	<	1	1
10	Cobalt	<	1	<	10	5.5	<	1	<	10	5.5
11	Copper	<	1		2.6	1.8	<	1		1.3	1.15
12	Iron		280		120	200		210		300	255
13	Lead	<	2	<	1	1.5	<	1	<	1	1
14	Magnesium		11000		13000	12000		9900		11000	10450
15	Manganese		34		16	25		82		49	65.5
16	Mercury †	<	0.1	<	0.2	0.15	<	0.1	<	0.2	0.15
17	Molybdenum		86		43	64.5	<	20		6	13
18	Nickel		2		5.3	3.65		9	<	2	5.5
19	Selenium		24		8.4	16.2	<	1	<	1	1
20	Silver ŧ		0.1	<	0.5	0.3	<	0.1	<	0.5	0.3
21	Sodium		N/A		N/A			N/A		N/A	
22	Thallium ₸	<	2	<	1	1.5	<	2	<	1	1.5
23	Tin	<	50		42	46	<	50		36	43
24	Titanium		37		18	27.5		7.5	<	10	8.75
25	Vanadium		N/A		N/A			N/A		N/A	
26	Yttrium		N/A		N/A			N/A		N/A	
27	Zinc		14		18	16		12	<	10	11

Using Ash Pond Effluent Data from Similar Facilities

Comparison of data shown in the EPA 2009 Study report between Widows Creek and KIF is difficult at best, and illustrates how fuel, facility, and operational characteristics result in wide variations in effluent metals concentrations. These characteristics are mentioned above, and include:

- type of coal burned,
- low-sulfur blend of coal,
- combustion process used,
- plant site characteristics, and
- intake water quality.

In fact, the following table illustrates a variability of coal combustion management practices at TVA's fossil plants:

Plant	Fly Ash	Bottom Ash	FGD wastewater
JSF	Dry	Sluice water	No FGD
BRF	Dry	Sluice water	Piped to ash pond
KIF	Sluice water	Sluice water	Separate Discharge
JOF	Sluice water	Sluice water	No FGD
CUF	Sluice water	Sluice water	Piped to ash pond
GAF	Sluice water	Sluice water	No FGD
ALF	Sluice water	Sluice water	No FGD

Statistical Variability of Ash Pond Effluent Concentrations

Ash pond effluent characteristics vary over time. Variations occur due to a number of factors, including changes in production cycles, variation in responses of ash ponds to influent changes, and, to a degree, seasonal changes in temperature and sunlight. NPDES permit procedures, including EPA rules at 40 CFR 122.44(d)(1), require TDEC to use a procedure that accounts for effluent variability.

When developing a BPJ limit, permit writers can use an approach consistent with EPA's ELG statistical approach. Specifically, the daily maximum limitation can be calculated by multiplying the long-term average by a daily variability factor. The monthly maximum limitation can be calculated similarly except that the variability factor corresponds to the distribution of monthly averages instead of daily concentration measurements.

The daily variability factor is a statistical entity defined as the ratio of the estimated 99th percentile of a distribution of daily values divided by the mean of the distribution. Similarly, the monthly variability factor is typically defined as the estimated 95th percentile of the distribution of 4-day averages divided by the mean of the monthly averages. A modified delta-lognormal distribution can be fit to concentration data.

Variability factors can then be computed for a facility distribution. The modified delta-lognormal distribution models the data as a mixture of non-detect observations and measured values. This distribution is often selected because the data for most analytes consists of a mixture of measured values and non-detects. The modified delta-lognormal distribution assumes that all non-detects have a value equal to the detection limit and that the detected values follow a lognormal distribution. [45]

Factor 4: Process Changes

As discussed above, TVA is underway with planning and design to convert all wet ash and gypsum storage to dry storage. At KIF, the conversion from wet sluicing of fly ash to dry stacking is under construction and plans are underway to make wet to dry conversion of bottom ash and dewatering of gypsum wastewater. Major reduction in wastewater flow through the ash pond is predicted from these projects. For example, the Kingston dry fly ash handling project will reduce ash pond effluent flow by approximately 80%, from 40 to 15 MGD.

Based on public statements made by TVA regarding conversion to dry ash to eliminate ash sluice water, this process change negates the need for consideration of additional controls, since ***no additional technology could be installed sooner*** than the dry ash conversion systems.

Factor 5: Non-water quality environmental impact including energy requirements

There is little or no information in current publications providing an insight for comparison of non-water environmental impacts of various technologies. Lack of information presents itself as an obstacle for the division in order to impose or even suggest a BPJ-derived technology-based limitation on any facility in Tennessee. Given that this aspect of analysis cannot assist us in selecting optimal treatment technologies for coal ash wastewater, non-environmental impacts cannot be identified (or used in a decision-making process) pending EPA's publication of revised ELGs, expected in 2013.

Factor 6: Cost of achieving effluent reduction

A reasonable estimate of cost for various technology options, as presented in the 2009 EPA report, combined with publicly available financial data, communications with permitted facilities and consulting firms can be made. There are several aspects of such analysis that may limit the division's ability to require, at this time, one technology solution over another.

A distinction must be made between existing and new sources. It is likely that retrofitting technology solutions on aging fossil plants may be a cost-prohibitive option. A much more

[45] EPA, *NPDES Permit Writers Manual, 1996*,Sec 5.1.4

detailed financial analysis, beyond the scope of BPJ-based limits, and expected as a part of ELG development, would be necessary in order to make such decision.

Considering the imminent promulgation of new/modified ELGs for this industry, it is our opinion that mandating a technology change at this time could have long-lasting negative effects. The reasons are as following: there is no definitive guidance (or an indication) what will be the technology of choice in the final ELGs. Such discrepancy in decision-making may have an consequence of imposing a BPJ technology based limit ultimately not deemed to be a BAT. Associated cost with such inconsistent application of technology-based solutions could be enormous and a waste of public resources.

Furthermore, one of the most important aspects of ELGs is to "level the playing field" on a national basis. Establishing potentially different BPJ technology-based limits at various states in the region (or even nation-wide) would be counterproductive, and would go against the intent of the rule.

H. CONCLUSION – PERMIT WRITER'S BEST PROFESSIONAL JUDGMENT

For the permit term of 2010 – 2013 (watershed cycle year), the NPDES permit for TVA Kingston Fossil Plant should **incorporate non-numeric Best Management Practices** to control concentrations of toxic metals as described herein. Consistent with 40 CFR 122.44(k)(3), the BMP approach is appropriate because establishment of numeric limits is infeasible pending EPA publication of revised Effluent Limitations Guidelines. Furthermore, during this permit term, TVA will be converting the KIF process to dry ash handling with major reductions of pollutant loading and developing plans for pond closure.

More detailed conclusions are presented below:

A. Establishment of numeric limits for toxic metals is infeasible for the following reasons:

1. Limited data - Effluent data for toxic metals consists of only three measurements by TVA over the previous 14 years; most effluent metals concentrations are less than detection.
2. Due to limited number of data points, accurate determination of permit limits based on effluent variability cannot be performed.
3. KIF effluent concentrations, when compared to other fossil discharges, are found to be highly variable due to multiple factors discussed in text above.
4. The EPA 2009 Study report does not provide enough effluent characterization of available technologies to enable establishing numeric effluent metals limits.

B. Cost data is not available to determine economic achievability pending publication by EPA of revised ELGs.

C. Non-water quality environmental impacts, such as energy requirements or handling/disposal of dry ash conversion can not be identified, pending publication by EPA of revised ELGs.

D. NPDES permits for TVA fossil plant ash pond discharges shall include permit conditions requiring Best Management Practices (BMPs) since establishment of justifiable numeric effluent limitations is currently infeasible.

1. Effluent guidelines are not available to prescribe numeric effluent limits for toxic metal discharges from TVA ash ponds nor to guarantee water quality sufficient for the protection of indigenous aquatic life. Clean Water Act rules provide for pollution controls supplemental to effluent limitations guidelines, known as Best Management Practices, or BMPs.

   In addition to the conditions established under 122.43(a), each NPDES permit shall include conditions meeting the following requirements when applicable.

   (k) ***Best management practices (BMPs)*** *to control or abate the discharge of pollutants when:*
   (1) Authorized under section 304(e) of the CWA for the control of toxic pollutants and hazardous substances from ancillary industrial activities; (2) Authorized under section 402(p) of the CWA for the control of storm water discharges;
   (3) Numeric effluent limitations are infeasible; *or*
   (4) The practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA.[46] *(emphasis added)*

2. BMPs may be incorporated as permit conditions to specifically address controls on toxic metals in ash pond discharges.
   - These controls can be site-specific to KIF operations and practices to address the circumstances of individual fossil plants.
   - Each practice must be developed and measured to document the relationship between operations and effluent metals concentrations.
   - BMPs should be established based on guidance shown in Attachment 1 with submission of a BMP Plan for division review within 60 days following the permit Effective Date.

3. Use of BMPs are a fundamental part of major NPDES permitting programs for CAFO, stormwater, and construction stormwater controls.

4. Development of BMPs will closely correspond to, and incorporate best practices from TVA ash pond closure projects following conversion to dry bottom and fly ash handling and gypsum

[46] 40 CFR 122.44 (k)

dewatering efforts. The BMP Plan submitted within 60 days following the effective date of this permit shall be amended as necessary to incorporate features of the dry bottom ash and dry gypsum handling projects implemented in the future. The amended plan must be submitted for division review at least 60 days prior to operation of the converted system.

Table 5-9. Ash Pond Effluent Concentrations

Analyte	Method	Unit	Homer City – Effluent from Bottom Ash Pond [a]	Widows Creek – Effluent from Combined Ash Pond [a]	Mitchell – Effluent from Fly Ash Pond [a]	Cardinal – Effluent from Fly Ash Pond [a, b]
Routine Metals - Total						
Aluminum	200.7	µg/L	323	1,070	404	344
Antimony	200.7	µg/L	ND (20.0)	ND (20.0)	24.6	21.2
Arsenic	200.7	µg/L	ND (10.0)	38.2	150	77.6
Barium	200.7	µg/L	101	227	133	165
Beryllium	200.7	µg/L	ND (5.00)	ND (5.00)	ND (5.00)	ND (5.00)
Boron	200.7	µg/L	396	2,210	2,350	1,100
Cadmium	200.7	µg/L	ND (5.00)	ND (5.00)	ND (5.00)	ND (5.00)
Calcium	200.7	µg/L	186,000	58,500	115,000	88,400
Chromium	200.7	µg/L	ND (10.0)	13.5	15.9	ND (10.0)
Cobalt	200.7	µg/L	ND (50.0)	ND (50.0)	ND (50.0)	ND (50.0)
Copper	200.7	µg/L	ND (10.0)	ND (10.0)	ND (10.0)	ND (10.0)
Iron	200.7	µg/L	355	144	ND (100)	ND (100)
Lead	200.7	µg/L	ND (50.0)	ND (50.0)	ND (50.0)	ND (50.0)
Magnesium	200.7	µg/L	31,800	6,680	21,000	17,900
Manganese	200.7	µg/L	128	ND (15.0)	ND (15.0)	64.7
Mercury	245.1	µg/L	ND (0.200)	ND (0.200)	ND (0.200)	ND (0.200)
Molybdenum	200.7	µg/L	19.7	143	359	361
Nickel	200.7	µg/L	ND (50.0)	ND (50.0)	ND (50.0)	ND (50.0)
Selenium	200.7	µg/L	6.02	16.2	177	44.5
Sodium	200.7	µg/L	106,000	21,300	526,000	70,800
Thallium	200.7	µg/L	ND (10.0)	ND (10.0)	ND (10.0)	ND (10.0)
Titanium	200.7	µg/L	ND (10.0)	14.5	ND (10.0)	12.6
Vanadium	200.7	µg/L	ND (20.0)	68.5	110	104
Yttrium	200.7	µg/L	ND (5.00)	ND (5.00)	ND (5.00)	ND (5.00)
Zinc	200.7	µg/L	21.6	ND (10.0)	ND (10.0)	ND (10.0)

Table 5-9. Ash Pond Effluent Concentrations

Analyte	Method	Unit	Homer City – Effluent from Bottom Ash Pond [a]	Widows Creek – Effluent from Combined Ash Pond [a]	Mitchell – Effluent from Fly Ash Pond [a]	Cardinal – Effluent from Fly Ash Pond [a, b]
Routine Metals - Dissolved						
Aluminum	200.7	µg/L	231	357	241	130 L
Antimony	200.7	µg/L	ND (20.0)	ND (20.0)	23.9	20.9
Arsenic	200.7	µg/L	ND (10.0)	30.1	138	74.6
Barium	200.7	µg/L	106	206	128	157
Beryllium	200.7	µg/L	ND (5.00)	ND (5.00)	ND (5.00)	ND (5.00)
Boron	200.7	µg/L	397	2,200	2,290	1,080
Cadmium	200.7	µg/L	ND (5.00)	ND (5.00)	ND (5.00)	ND (5.00)
Calcium	200.7	µg/L	192,000	55,400	113,000	87,200
Cerium	200.7	µg/L	ND (10.0)	11.9	14.1	ND (10.0)
Hexavalent Chromium	D1687-92	µg/L	ND (2.00)	12.0	7.00	<3.50
Cobalt	200.7	µg/L	ND (50.0)	ND (50.0)	ND (50.0)	ND (50.0)
Copper	200.7	µg/L	ND (10.0)	ND (10.0)	ND (10.0)	ND (10.0)
Iron	200.7	µg/L	106	ND (100)	ND (100)	ND (100)
Lead	200.7	µg/L	ND (50.0)	ND (50.0)	ND (50.0)	ND (50.0)
Magnesium	200.7	µg/L	32,600	6,430	20,300	17,700
Manganese	200.7	µg/L	129	ND (15.0)	ND (15.0)	42.9
Mercury	245.1	µg/L	ND (0.200)	ND (0.200)	ND (0.200)	ND (0.200)
Molybdenum	200.7	µg/L	20.2	136	330	352
Nickel	200.7	µg/L	ND (50.0)	ND (50.0)	ND (50.0)	ND (50.0)
Selenium	200.7	µg/L	6.10 L	15.3	162	43.8
Sodium	200.7	µg/L	106,000	20,000	514,000	70,300
Thallium	200.7	µg/L	ND (10.0)	ND (10.0)	ND (10.0)	ND (10.0)
Titanium	200.7	µg/L	ND (10.0)	ND (10.0)	ND (10.0)	ND (10.0)
Vanadium	200.7	µg/L	ND (20.0)	64.7	108	99.9
Yttrium	200.7	µg/L	ND (5.00)	ND (5.00)	ND (5.00)	ND (5.00)
Zinc	200.7	µg/L	35.2	ND (10.0)	ND (10.0)	ND (10.0)

Table 5-9. Ash Pond Effluent Concentrations

Analyte	Method	Unit	Homer City – Effluent from Bottom Ash Pond [1]	Widows Creek – Effluent from Combined Ash Pond [1]	Mitchell – Effluent from Fly Ash Pond [2]	Cardinal – Effluent from Fly Ash Pond [2,3]
Low-Level Metals - Total						
Antimony	1638	µg/L	1.09	4.39	25.8	21.9
Arsenic	1638	µg/L	6.52	34.9	142	69.8
Cadmium	1638	µg/L	ND (0.500)	ND (0.500)	1.32	1.14
Chromium	1638	µg/L	ND (4.00)	13.5 L	20.4	4.64 L
Copper	1638	µg/L	2.37	1.49	5.47	2.98
Lead	1638	µg/L	ND (0.250)	0.490	0.580	0.420
Mercury	1631E	µg/L	0.00511	0.00157	0.00212	0.00125
Nickel	1638	µg/L	10.7	ND (5.00)	11.0	10.7
Selenium	1638	µg/L	5.74	17.1	191	45.8
Thallium	1638	µg/L	1.32	1.46	1.72	2.84
Zinc	1638	µg/L	24.2	ND (2.50)	10.1	5.98
Low-Level Metals - Dissolved						
Antimony	1638	µg/L	0.990	4.45	22.5	22.4
Arsenic	1638	µg/L	5.00	29.0	131	68.9
Cadmium	1638	µg/L	ND (0.500)	ND (0.500)	1.17	1.11
Chromium	1638	µg/L	ND (4.00)	12.6 L	16.0	4.49 L
Hexavalent Chromium	1636	µg/L	3.01	14.7	17.4	3.96
Copper	1638	µg/L	2.08	ND (1.00)	4.54	2.27
Lead	1638	µg/L	ND (0.250)	ND (0.250)	ND (0.250)	ND (0.250)
Mercury	1631E	µg/L	0.00141	ND (0.000500)	ND (0.000500)	ND (0.000500)
Nickel	1638	µg/L	10.4	ND (5.00)	9.57	10.6
Selenium	1638	µg/L	5.16	15.6	161	45.0
Thallium	1638	µg/L	1.31	1.49	1.42	2.87
Zinc	1638	µg/L	15.0	ND (2.50)	9.51	4.15

Table 5-9. Ash Pond Effluent Concentrations

Analyte	Method	Unit	Homer City – Effluent from Bottom Ash Pond [a]	Widows Creek – Effluent from Combined Ash Pond [a]	Mitchell – Effluent from Fly Ash Pond [a]	Cardinal – Effluent from Fly Ash Pond [a, b]
Classicals						
Ammonia As Nitrogen (NH_3-N)	4500-NH_3F	mg/L	0.340	0.160	0.150	0.305
Nitrate/Nitrite (NO_3-N + NO_2-N)	353.2	mg/L	37.0	0.230	0.730	4.73 E
Total Kjeldahl Nitrogen (TKN)	4500-N,C	mg/L	1.36	3.39	ND (0.100)	<0.785 L
Biochemical Oxygen Demand (BOD)	5210B	mg/L	ND (2.00)	4.00	2.00	ND (2.00)
Chloride	4500-CL-C	mg/L	90.0	20.0	240	60.0
Hexane Extractable Material (HEM)	1664A	mg/L	ND (5.00)	6.00	ND (5.00)	10.0
Silica Gel Treated HEM (SGT-HEM)	1664A	mg/L	NA	ND (5.00)	NA	ND (4.00)
Sulfate	D516-90	mg/L	1,290	80.7	1,110	494
Total Dissolved Solids (TDS)	2540 C	mg/L	1,250	281	2,030	673
Total Phosphorus	365.3	mg/L	1.09	0.250 E	0.200	0.0870
Total Suspended Solids (TSS)	2540 D	mg/L	5.00	12.0 E	15.0	6.00

Source: [ERG, 2008l; ERG, 2008m; ERG, 2008k; ERG, 2008o].

Note: EPA used several analytical methods to analyze for metals during the sampling program. For the purposes of sampling program, EPA designated some of the analytical methods as "routine" and some of them as "low-level." EPA designated all of the methods that require the use of clean hands/dirty hands sample collection techniques (i.e., EPA Method 1669 sample collection techniques) as "low-level" methods. Note that although not required by the analytical method, EPA used clean hands/dirty hands collection techniques for all low-level and routine metals samples.

a – The concentrations presented have been rounded to three significant figures.

b – The ash pond effluent results represent the average of the ash pond effluent and the duplicate of the ash pond effluent analytical measurements.

< – Average result includes at least one non-detect value. (Calculation uses the report limit for non-detected results).

E – Sample analyzed outside holding time.

L – Sample result between 5x and 10x blank result.

NA – Not analyzed.

ND – Not detected (number in parenthesis is the report limit). The sampling episode reports for each of the individual plants contains additional sampling information, including analytical results for analytes measured above the detection limit, but below the reporting limit (i.e., J-values).

ATTACHMENT 1

BEST MANAGEMENT PRACTICES [1]

A. GENERAL CONDITIONS

For purposes of this part, the terms "pollutant" or "pollutants" refer to any substance **listed as toxic under Section 307(a)(1) of the Clean Water Act, oil, as defined in Section** 311(a)(1) of the Act, and any substance listed as hazardous under Section 311 of the Act. The permittee shall develop and implement a Best Management Practices (BMP) plan which prevents, or minimizes the potential for, the release of pollutants (including oil and grease) from *ancillary activities*, including material storage areas; plant site runoff; in-plant transfer, process and material handling areas; loading and unloading operations, and sludge and waste disposal areas, to the waters of the State of Tennessee through plant site runoff; spillage or leaks; sludge or waste disposal; or drainage from raw material storage.

B. GENERAL REQUIREMENTS

The BMP program shall:

1. Be documented in narrative form, and shall include any necessary plot plans, drawings, or maps;

2. Establish specific objectives for the control of toxic and hazardous pollutants:

   a. Each facility component or system shall be examined for its potential for causing a release of significant amounts of toxic or hazardous pollutants to waters of the State of Tennessee due to equipment failure, improper operation, natural phenomena such as rain or snowfall, etc.;

   b. Where experience indicates a reasonable potential for equipment failure (e.g., a tank overflow or leakage), natural condition (e.g., precipitation), or other circumstances to result in significant amounts of toxic or hazardous pollutants reaching surface waters, the plan should include a prediction of the direction, rate of flow, and total quantity of toxic or hazardous pollutants which could be discharged from the facility as a result of each condition or circumstance;

3. Establish specific best management practices to meet the objectives identified under section B.2. contained herein, addressing each component or system capable of causing a release of significant amounts of toxic or hazardous pollutants to the waters of the State of Tennessee;

4. The BMP program:

   a. May reflect requirements for Spill Prevention Control and Countermeasure (SPCC) plans under section 311 of the Act and Title 40 CFR part 112, and may incorporate any part of such plans into the BMP program by reference;

   b. Shall assure the proper management of solid and hazardous waste in accordance with regulations promulgated under the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976 (RCRA) (40 U.S.C. §6901, et. seq.). Management practices required under RCRA regulations shall be expressly incorporated into the BMP program; and,

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[1] Note: Additional technical information on BMPs and the elements of a BMP program is contained in EPA publications entitled "Guidance Manual for Developing Best Management Practices (BMP)" (EPA 833-B-93-004) and "Stormwater Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices" (EPA 832-R-92-006).

c. Shall address the following points for the ancillary activities listed in section A.1.:

i. Statement of policy;
ii. Spill Control Committee: responsible for BMP program implementation and subsequent review and updating;
iii. Material inventory: identification of all sources and quantities of toxic and hazardous substances handled or produced, including plant drawings and plot plans, materials flow diagrams, physical, chemical, toxicological, and health information on toxic and hazardous substances, and investigation and evaluation of new materials;
iv. Material compatibility: evaluation of process changes or revisions for materials compatibility, review of properties of chemicals handled and materials of construction, evaluation of means of chemical disposal and incompatibility, cleansing of vessels and transfer lines, and use of proper coatings and cathodic protection on buried pipelines if required;
v. Employee training: meetings to be held at frequent intervals, spill drills, adequate job training, transmission of information on past spills and causes, informing employees of BMP program components, training in cleanup procedures, and review and interface with safety program;
vi. Reporting and notification procedures: maintenance of records of spills through formal reports for internal review, notification as required by law to governmental and environmental agencies in the event of a spill, and procedures for notifying the appropriate plant personnel;
vii. Visual inspections: routine inspections with visual observations of storage facilities, transfer pipelines, and loading and unloading areas, detailed inspections of pipes, pumps, valves, fittings, tank corrosion, tank support and foundation deterioration, etc.;
viii. Preventive maintenance: identification of equipment and systems to which the preventive maintenance program should apply, periodic inspection and testing of such equipment and systems, appropriate adjustment, repair, or replacement of parts, and maintenance of preventive maintenance records;
ix. Good housekeeping: neat and orderly storage of chemicals, prompt removal of small spillage, regular garbage pickup, maintenance of dry and clean floors, proper pathways and walkways, minimum accumulation of liquid and solid chemicals on the ground or floor in a building, and stimulation of employee interest in good housekeeping;
x. Security: plant patrols, fencing, good lighting, traffic control, controlled access where appropriate, visitor passes, locked entrances, locks on drain valves and pumps for chemical storage tanks, and television monitoring.

C. DOCUMENTATION

The permittee shall maintain the BMP plan at the facility and shall make the plan available to the permit issuing authority upon request.

D. BMP PLAN MODIFICATION

The permittee shall amend the BMP plan whenever there is a change in the facility or change in the operation of the facility, which materially increases the potential for the ancillary activities to result in a discharge of significant amounts of pollutants.

E. MODIFICATION FOR INEFFECTIVENESS

If the BMP plan proves to be ineffective in achieving the general objective of preventing the release of significant amounts of pollutants to surface waters and the specific objectives and requirements under section B, the permit shall be subject to modification pursuant to 40 CFR 122.62 or 122.63 to incorporate revised BMP requirements. Any such permit modification shall be subject to review in accordance with the procedures for permit appeals set forth in accordance with 69-3-110, Tennessee Code Annotated.

APPENDIX 1

FACILITY DISCHARGES AND RECEIVING WATERS

OUTFALL 001	
LONGITUDE	LATITUDE
84-30-15	35-54-15

FLOW (MGD)	DISCHARGE SOURCE
0.180	Redwater wetlands
0.145	Coal yard runoff pond discharge
0.005	Chemical metal cleaning wastes (IMP005)
0.002	Nonchemical metal cleaning wastes
0.002	Ammonia storage runoff
6.814	Bottom ash sluice water and groundwater
25.178	Fly ash sluice wastewater
0.267	Water treatment plant wastes
7.712	Station sump discharge
0.574	Precipitation
-0.238	Evaporation
-0.170	Seepage to redwater wetland
0.012	AAF precipitator washdown
40.483	TOTAL DISCHARGE

RECEIVING STREAM
DISCHARGE ROUTE
Discharges from the ash pond to the Clinch (Emory) River at the facilities condenser intake channel. Treatment includes settling and neutralization in a 118 acre ash (treatment) pond. Ash and other solids remain in pond and are physically removed periodically.

STREAM LOW FLOW (CFS)	7Q10	1Q10 *	30Q5
	N/A	241.0	241.0
(MGD)	N/A	155.8	155.8

STREAM USE CLASSIFICATIONS				
FISH	RECREATION	IRRIGATION	LW&W	DOMESTIC
X	X	X	X	X
INDUSTRIAL	NAVIGATION			
X	X			

OUTFALL 002	
LONGITUDE	LATITUDE
84-31-15	35-53-45

FLOW (MGD)	DISCHARGE SOURCE
0.010	Transformer yard and switchyard runoff
0.014	Boiler blowdown
1296.627	Once-through condenser cooling water
0.243	Intake screen backwash
0.018	precipitator area runoff
1296.912	TOTAL DISCHARGE

RECEIVING STREAM
DISCHARGE ROUTE
Discharges to mile 2.9 of the Clinch River. This discharge includes the discharges from Outfalls 001 and O1A to the condenser intake channel. There is no treatment at this stage.

STREAM LOW FLOW (CFS)	7Q10	1Q10 *	30Q5
	N/A	241.0	241.0
(MGD)	NA	155.8	155.8

STREAM USE CLASSIFICATIONS				
FISH	RECREATION	IRRIGATION	LW&W	DOMESTIC
X	X	X	X	X
INDUSTRIAL	NAVIGATION			
X	X			

* These low flows include contributions from Norris Dam (200 cfs), Emory River (.04 cfs), Poplar Creek (8.95 cfs), and East Fork Poplar Creek (32.2 cfs), for a total of 241 cfs at the 1Q10 low flow. Norris Dam is included since the discharge from Melton Dam is nothing more than a "pass-through" of the Norris Dam flow.

APPENDIX 1

FACILITY DISCHARGES AND RECEIVING WATERS

OUTFALL 006	
LONGITUDE	LATITUDE
84-30-45	35-54-00

FLOW (MGD)	DISCHARGE SOURCE
0.520	Non-contact Cooling Water
	(no additives used)
0.520	TOTAL DISCHARGE

RECEIVING STREAM			
DISCHARGE ROUTE			
Plant intake channel. There is no treatment at this stage.			
STREAM LOW FLOW (CFS)	7Q10	1Q10	30Q2
	N/A	NA	N/A
(MGD)	NA	NA	NA

STREAM USE CLASSIFICATIONS				
FISH	RECREATION	IRRIGATION	LW&W	DOMESTIC
N/A	N/A	N/A	N/A	N/A
INDUSTRIAL	NAVIGATION			
N/A	N/A			

OUTFALL 007	
LONGITUDE	LATITUDE
84-30-00	35-54-00

FLOW (MGD)	DISCHARGE SOURCE
0.052	North Parking Area Drainage and Abandoned Ash Pond Area Seepage (F15)
0.052	TOTAL DISCHARGE

RECEIVING STREAM			
DISCHARGE ROUTE			
Plant intake channel. There is no treatment at this stage.			
STREAM LOW FLOW (CFS)	7Q10	1Q10	30Q2
	N/A	NA	N/A
(MGD)	NA	NA	NA

STREAM USE CLASSIFICATIONS				
FISH	RECREATION	IRRIGATION	LW&W	DOMESTIC
N/A	N/A	N/A	N/A	N/A
INDUSTRIAL	NAVIGATION			
N/A	N/A			

OUTFALL 008	
LONGITUDE	LATITUDE
84-30-00	35-54-00

FLOW (MGD)	DISCHARGE SOURCE
	Drainage from Sluice Line Trench:
0.016	Precipitation
0.000	Intermittent discharge from ruptured ash sluice line
0.016	TOTAL DISCHARGE

RECEIVING STREAM			
DISCHARGE ROUTE			
Plant intake channel. There is no treatment at this stage.			
STREAM LOW FLOW (CFS)	7Q10	1Q10	30Q2
	N/A	NA	N/A
(MGD)	NA	NA	NA

STREAM USE CLASSIFICATIONS				
FISH	RECREATION	IRRIGATION	LW&W	DOMESTIC
N/A	N/A	N/A	N/A	N/A
INDUSTRIAL	NAVIGATION			
N/A	N/A			

APPENDIX 1

FACILITY DISCHARGES AND RECEIVING WATERS

OUTFALL 02A	
LONGITUDE	LATITUDE
84-31-11	35-53-48

FLOW (MGD)	DISCHARGE SOURCE
0.961	Process wastewater
	mixed with 1297 mgd of cooling water
0.961	TOTAL DISCHARGE

RECEIVING STREAM			
DISCHARGE ROUTE			
Discharges to mile 2.9 of the Clinch River. This discharge enters the fossil plant discharge channel mixed with 1297 mgd of condenser cooling water, ash pond discharges, and minor wastestreams.			
STREAM LOW	7Q10	1Q10 *	30Q2
FLOW (CFS)	N/A	241.0	N/A
(MGD)	NA	155.8	NA

STREAM USE CLASSIFICATIONS (WATER QUALITY)				
FISH	RECREATION	IRRIGATION	LW&W	DOMESTIC
X	X	X	X	X
INDUSTRIAL	NAVIGATION			
X	X			

* These low flows include contributions from Norris Dam (200 cfs), Emory River (.04 cfs), Poplar Creek (8.95 cfs), and East Fork Poplar Creek (32.2 cfs), for a total of 241 cfs at the 1Q10 low flow. Norris Dam is included since the discharge from Melton Dam is nothing more than a "pass-through" of the Norris Dam flow.

APPENDIX 2

APPLICABLE EFFLUENT LIMITATIONS GUIDELINES

40 CFR PART 423 EFFLUENT LIMITATION GUIDELINES
STEAM ELECTRIC POWER GENERATING POINT SOURCE CATEGORY

	Fly Ash & Bottom Ash Transport Water			
	§423.12(b)(4) - BPT		§423.13 - BAT	
EFFLUENT CHARACTERISTIC	Average of Daily Values for 30 Consecutive Days [mg/l]	Maximum for Any 1 Day [mg/l]	Average of Daily Values for 30 Consecutive Days [mg/l]	Maximum for Any 1 Day [mg/l]
TSS	30.0	100.0	--	--
Oil & Grease	15.0	20.0	--	--
pH	6.0 - 9.0	6.0 - 9.0	--	--

Note: 1. The quantity of pollutants discharged shall not exceed the quantity determined by by multiplying the flow of fly ash & bottom ash transport water times the concentration listed. At the permitting authority's discretion, the quantity of pollutant allowed to be discharged may be expressed as a concentration limitation instead of the mass based limitations specified. Concentration limitations shall be those specified above.

2. There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.

40 CFR PART 423 EFFLUENT LIMITATION GUIDELINES
STEAM ELECTRIC POWER GENERATING POINT SOURCE CATEGORY

	Low Volume Waste Sources			
	§423.12(b)(3) - BPT		§423.13 - BAT	
EFFLUENT CHARACTERISTIC	Average of Daily Values for 30 Consecutive Days [mg/l]	Maximum for Any 1 Day [mg/l]	Average of Daily Values for 30 Consecutive Days [mg/l]	Maximum for Any 1 Day [mg/l]
TSS	30.0	100.0	--	--
Oil & Grease	15.0	20.0	--	--
pH	6.0 - 9.0	6.0 - 9.0	--	--

Note: 1. The quantity of pollutants discharged shall not exceed the quantity determined by by multiplying the flow of low volume waste sources times the concentration listed. At the permitting authority's discretion, the quantity of pollutant allowed to be discharged may be expressed as a concentration limitation instead of the mass based limitations specified. Concentration limitations shall be those specified above.

2. There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.

APPENDIX 2

APPLICABLE EFFLUENT LIMITATIONS GUIDELINES

40 CFR PART 423 EFFLUENT LIMITATION GUIDELINES
STEAM ELECTRIC POWER GENERATING POINT SOURCE CATEGORY

	Metal Cleaning Wastes			
	§423.12(b)(5) - BPT		§423.13(e) - BAT	
EFFLUENT CHARACTERISTIC	Average of Daily Values for 30 Consecutive Days [mg/l]	Maximum for Any 1 Day [mg/l]	Average of Daily Values for 30 Consecutive Days [mg/l]	Maximum for Any 1 Day [mg/l]
TSS	30.0	100.0	--	--
Oil & Grease	15.0	20.0	--	--
Copper (T)	1.0	1.0	1.0	1.0
Iron (T)	1.0	1.0	1.0	1.0
pH	6.0 - 9.0	6.0 - 9.0	--	--

* Applicable to chemical metal cleaning wastes.

Note: 1. The quantity of pollutants discharged shall not exceed the quantity determined by by multiplying the flow of metal cleaning wastes times the concentration listed. At the permitting authority's discretion, the quantity of pollutant allowed to be discharged may be expressed as a concentration limitation instead of the mass based limitations specified. Concentration limitations shall be those specified above.

2. There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.

3. §423.12 refers to metal cleaning wastes while §423.13 refers to chemical metal cleaning wastes only.

40 CFR PART 423 EFFLUENT LIMITATION GUIDELINES
STEAM ELECTRIC POWER GENERATING POINT SOURCE CATEGORY

	Coal Pile Runoff			
	§423.12(b)(9) - BPT		§423.13 - BAT	
EFFLUENT CHARACTERISTIC	Average of Daily Values for 30 Consecutive Days [mg/l]	Maximum Concentration for Any Time [mg/l]	Average of Daily Values for 30 Consecutive Days [mg/l]	Maximum for Any 1 Day [mg/l]
TSS	--	50.0	--	--
pH	6.0 - 9.0	6.0 - 9.0	--	--

Note: 1. Any untreated flow from facilities designed, constructed, and operated to treat the volume of coal pile runoff which is associated with a 10 year, 24 hour rainfall event shall not be subject to the coal pile runoff limit for TSS.

2. There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.

APPENDIX 2

APPLICABLE EFFLUENT LIMITATIONS GUIDELINES

40 CFR PART 423 EFFLUENT LIMITATION GUIDELINES
STEAM ELECTRIC POWER GENERATING POINT SOURCE CATEGORY

	Once Through Cooling Water			
	§423.12(b)(6) - BPT		§423.13(b) - BAT	
EFFLUENT CHARACTERISTIC	Average Concentration [mg/l]	Maximum Concentration [mg/l]	Average Concentration [mg/l]	Maximum Concentration [mg/l]
Free Available Chlorine	0.2 *	0.5 *	0.2 *	0.5 *
Total Residual Chlorine	--	--	--	0.20 **

* §423.12 is applicable to all plants. §423.13 is applicable to plants with a total rated electric generating capacity of less than 25 megawatts only. Neither free available chlorine nor total residual chlorine may be discharged from any single generating unit for more than two hours in any one day and not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless the utility can demonstrate to the permitting authority that the units in a particular location cannot operate at or below this level of chlorination.

** Plant with a total rated electric generating capacity of 25 or more megawatts only. Total residual chlorine may not be discharged from any single generating unit for more than two hours per day unless the discharger demonstrates to the permitting authority that discharge for more than two hours is required for macroinvertebrate control. Simultaneous multi-unit chlorination is permitted.

Note: 1. The quantity of pollutants discharged shall not exceed the quantity determined by by multiplying the flow of once through cooling water times the concentration listed. At the permitting authority's discretion, the quantity of pollutant allowed to be discharged may be expressed as a concentration limitation instead of the mass based limitations specified. Concentration limitations shall be those specified above.

2. There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.

40 CFR PART 423 EFFLUENT LIMITATION GUIDELINES
STEAM ELECTRIC POWER GENERATING POINT SOURCE CATEGORY

	Cooling Tower Blowdown			
	§423.12(b)(7) - BPT		§423.13(d)(1) - BAT	
EFFLUENT CHARACTERISTIC	Average Concentration [mg/l]	Maximum Concentration [mg/l]	Average Concentration [mg/l]	Maximum Concentration [mg/l]
Free Available Chlorine	0.2	0.5	0.2	0.5
126 Priority Pollutants **	--	--	No detectable amount *	

* The 126 priority pollutants (Appendix A) contained in chemicals added for cooling tower maintenance, except: Chromium, Ttl. (0.2 mg/l as both Maximum Concentration and Average Concentration) and Zinc, Ttl. (1.0 mg/l as both Maximum Concentration and Average Concentration).

Note: The quantity of pollutants discharged shall not exceed the quantity determined by by multiplying the flow of cooling tower blowdown times the concentration listed above.

APPENDIX 3

PREVIOUS PERMIT LIMITS AND MONITORING REQUIREMENTS

PERMIT LIMITS

OUTFALL 001

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY			
	AVG. CONC. (mg/l)	AVG. AMNT. (lb/day)	MAX. CONC. (mg/l)	MAX. AMNT. (lb/day)	MSRMNT. FRQNCY.	SAMPLE TYPE
FLOW	Report (MGD) [1]		Report (MGD) [1]		1/Week	Instantaneous
pH [2]	--	--	Minimum of 6.0		1/Week	Grab
OIL & GREASE	14.4	--	19.4	--	1/Month	Grab
TOTAL SUSPENDED SOLIDS [3] (TSS)	29.9	--	92.0	--	1/Month	Grab

1 Flow shall be reported in Million Gallons per Day (MGD).

2 pH analyses shall be performed within fifteen (15) minutes of sample collection.

3 The permittee shall take reasonable steps to prevent discharge of cenospheres other than in trace amounts from the outfall.

APPENDIX 3

PREVIOUS PERMIT LIMITS AND MONITORING REQUIREMENTS

PERMIT LIMITS

OUTFALL 002

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY			
	AVG. CONC. (mg/l)	AVG. AMNT. (lb/day)	MAX. CONC. (mg/l)	MAX. AMNT. (lb/day)	MSRMNT. FRQNCY.	SAMPLE TYPE
FLOW	Report (MGD) [1]		Report (MGD) [1]		Daily	Pump logs
pH [2]	Range 6.0 to 9.0				1/Week	Grab
TEMPERATURE, Intake	--		Report		Continuous [9]	Recorder
TEMPERATURE, Effluent	--		36.1°C (97.0°F)		Daily	Calculate [3]
TOTAL RESIDUAL OXIDANT (reported as chlorine) [4]	0.038	--	0.066	--	1 / Week	Grab [6]
TOTAL RESIDUAL OXIDANT (reported as chlorine) [5]	0.011	--	0.019	--	1 / Week	Grab [6]
TIME OF OXIDANT ADDITION (minutes/day/unit)	--		120 [7]		1 / Day	Log Records
IC25	Survival, Reproduction, & Growth in 100% Effluent				See note 8	Composite [8]

1 Flow shall be reported in Million Gallons per Day (MGD).

2 pH analyses shall be performed within fifteen (15) minutes of sample collection.

3 Intake temperature is measured hourly (continuously) but reported as a daily average once per day. The daily average discharge temperature shall be calculated for the cooling channel based on the 24-hour average intake temperature, 24-hour average unit load, and the 24-hour average flow through Outfall 002.

4 The limits depicted are applicable at flows of 654 MGD, and above, from Outfall 002.

5 The limits depicted are applicable at flows less than 654 MGD, in lieu of the limits shown in footnote 4.

6 Flow weighted maximum shall be calculated from instantaneous measurements of the chlorinated discharges from a unit and adjusted for flow from the non-chlorinated units contributing to the discharge. The calculated flow-weighted maximum will be used for determination of compliance with the daily maximum limitation. Except for periods of macroinvertebrate control when oxidant addition is required (see Permit - Part III), samples shall be taken once at the beginning of the period of chlorination for one unit and once every 15 minutes thereafter. At the end of the period of chlorination for that unit, one sample shall be taken. Sampling for these oxidants is not required when there is no chlorine/bromine added during that day. TRC analyses shall be performed within fifteen (15) minutes of sample collection.

7 Application of a oxidant (bromine/chlorine) beyond the 120 minutes per day will be allowed to facilitate nuisance macroinvertebrate control according to the Plan for such activities described in Permit - Part III.

8 See Part III for sampling requirements and monitoring frequency of toxicity tests.

APPENDIX 3

PREVIOUS PERMIT LIMITS AND MONITORING REQUIREMENTS

PERMIT LIMITS

INTERNAL MONITORING POINT 005

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY			
	AVG. CONC. (mg/l)	AVG. AMNT. (lb/day)	MAX. CONC. (mg/l)	MAX. AMNT. (lb/day)	MSRMNT. FRQNCY.	SAMPLE TYPE
FLOW	Report (MGD) *		Report (MGD) *		1/Batch	Estimate *
IRON, TOTAL	1.0	--	1.0	--	**	Grab
COPPER,TOTAL	1.0	--	1.0	--	**	Grab

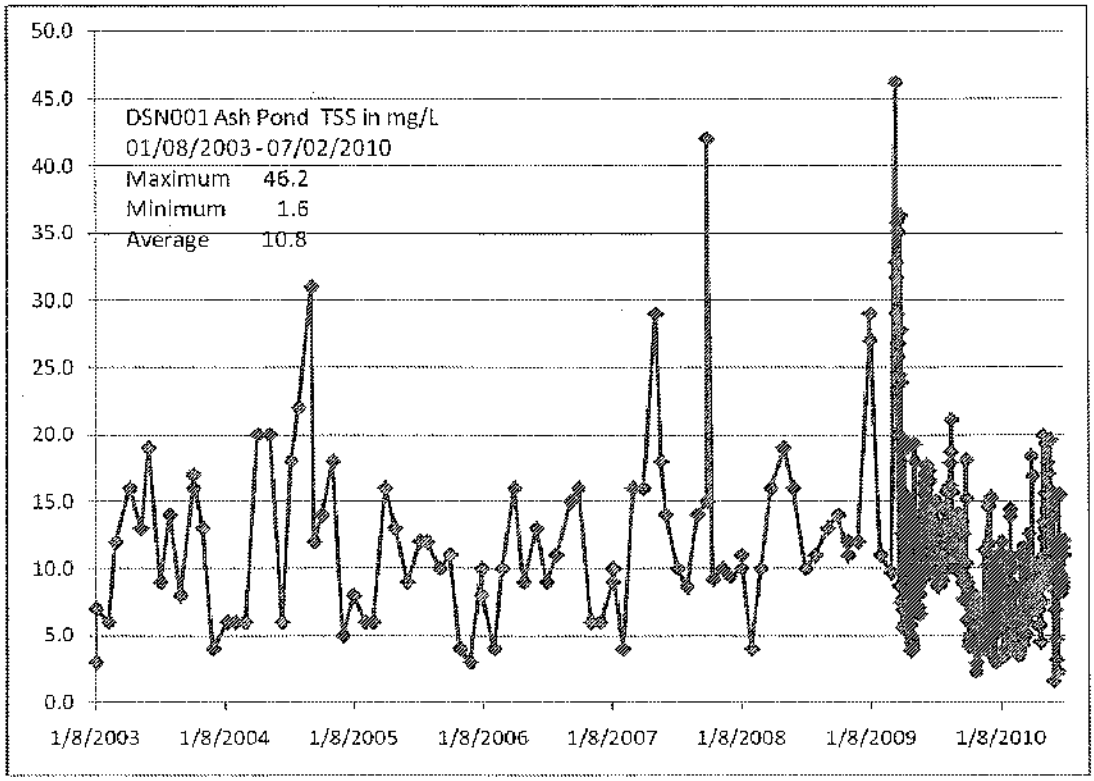
Metal cleaning wastes shall mean any cleaning compounds, rinse waters, or any other waterborne residues derived from cleaning any metal process equipment including, but not limited to, boiler tube cleaning, boiler fireside cleaning, and air preheater cleaning.

* Flow shall be based on beginning and ending staff gage readings of the pond and reported in Million Gallons per Day (MGD).

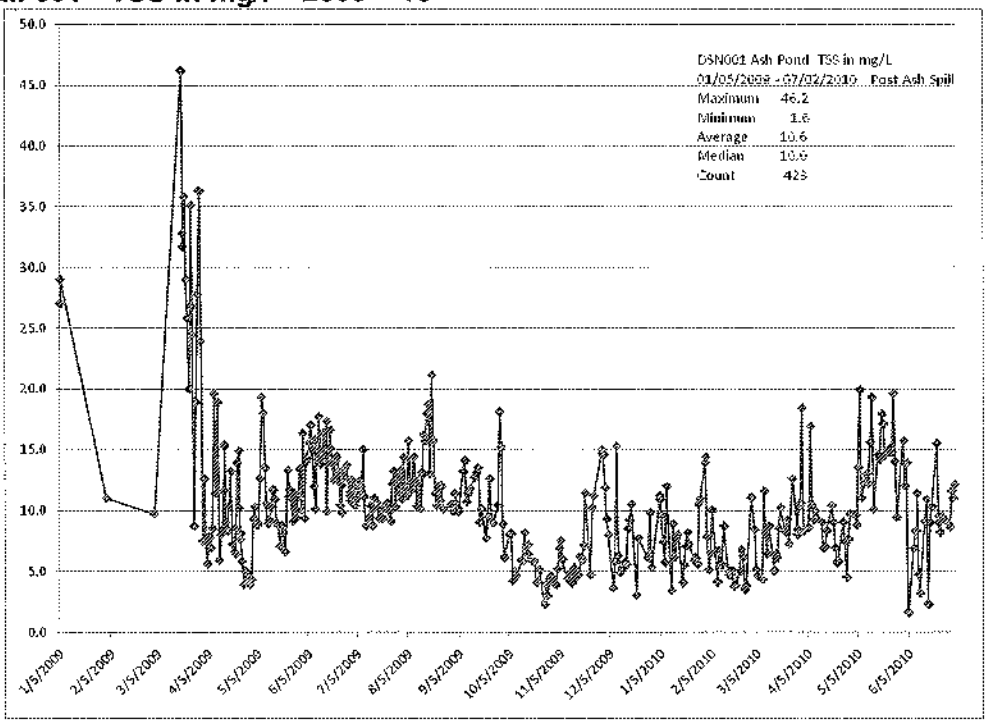
** Samples shall be taken at the beginning and end of a discharge event for each batch treated.

APPENDIX 4

HISTORICAL MONITORING AND INSPECTION

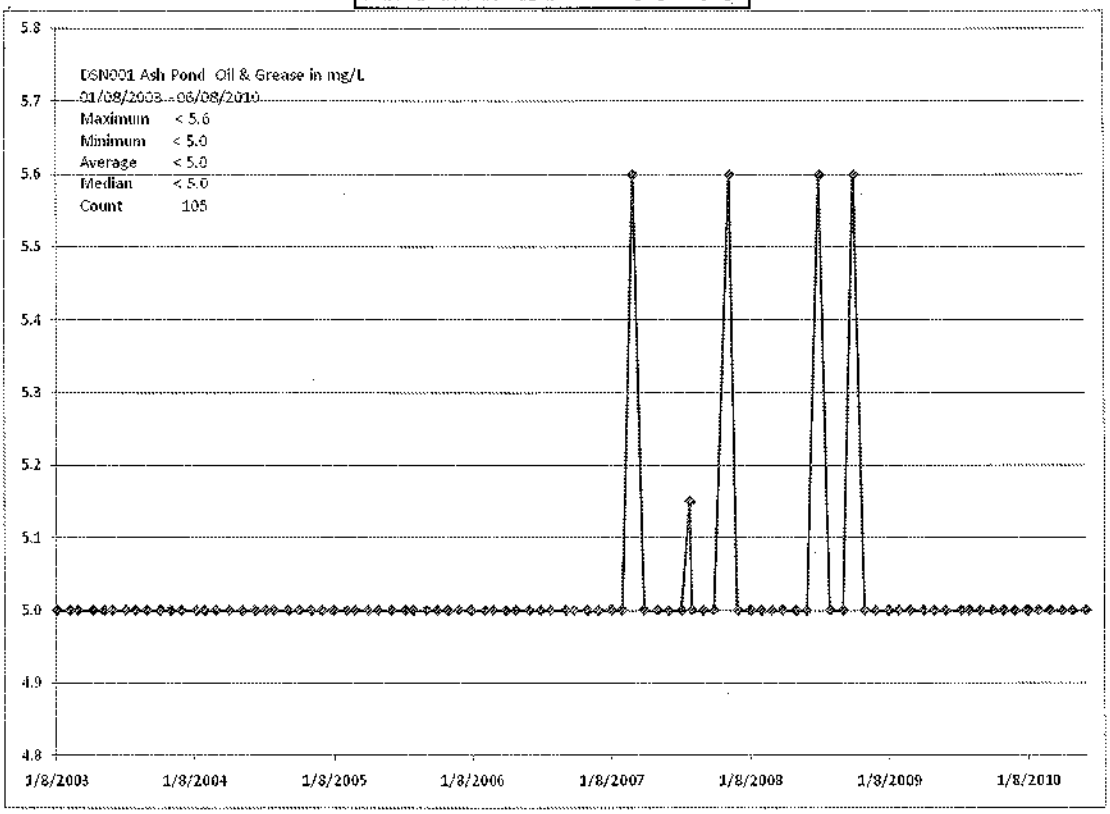


Outfall 001 - TSS in mg/l – 2003 – 10

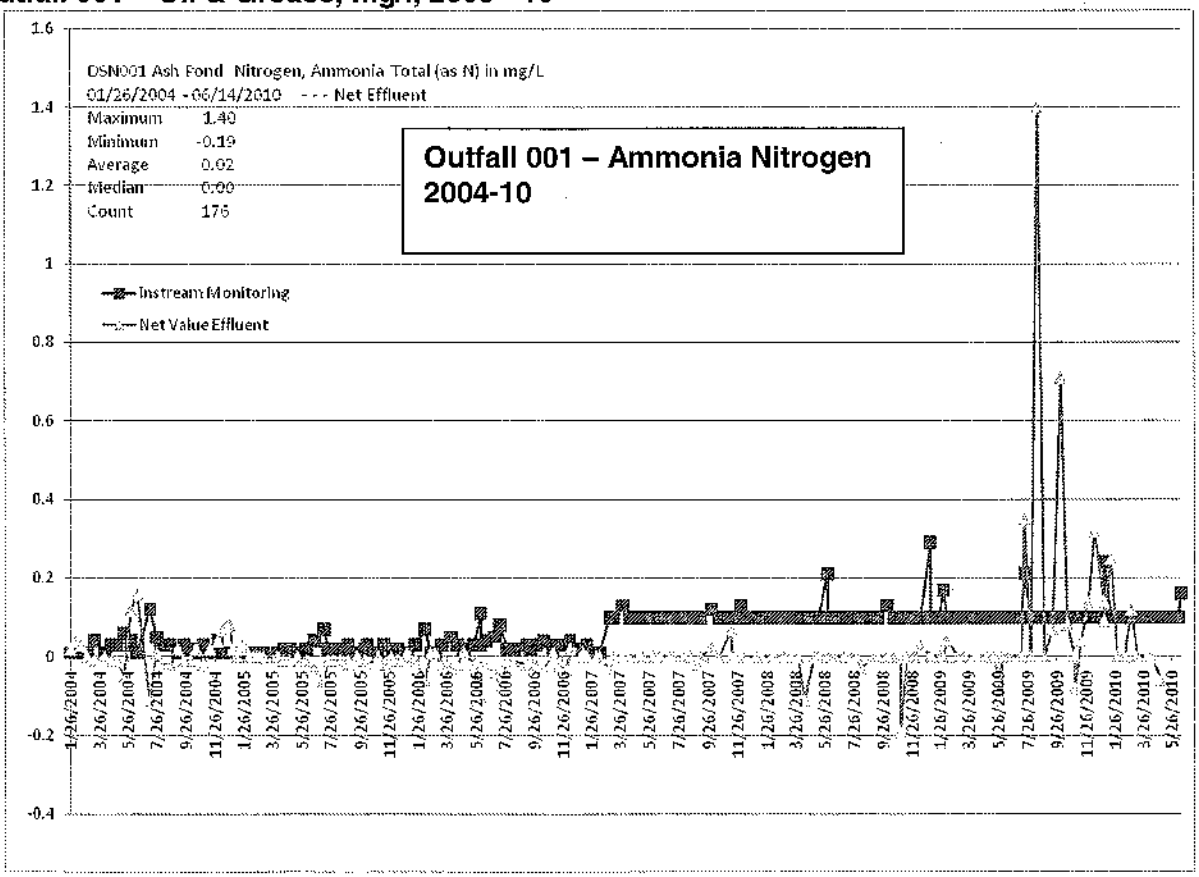


Outfall 001 - TSS in mg/l – Post-Ash Spill, Jan 09 – June 10

APPENDIX 4 – cont'd

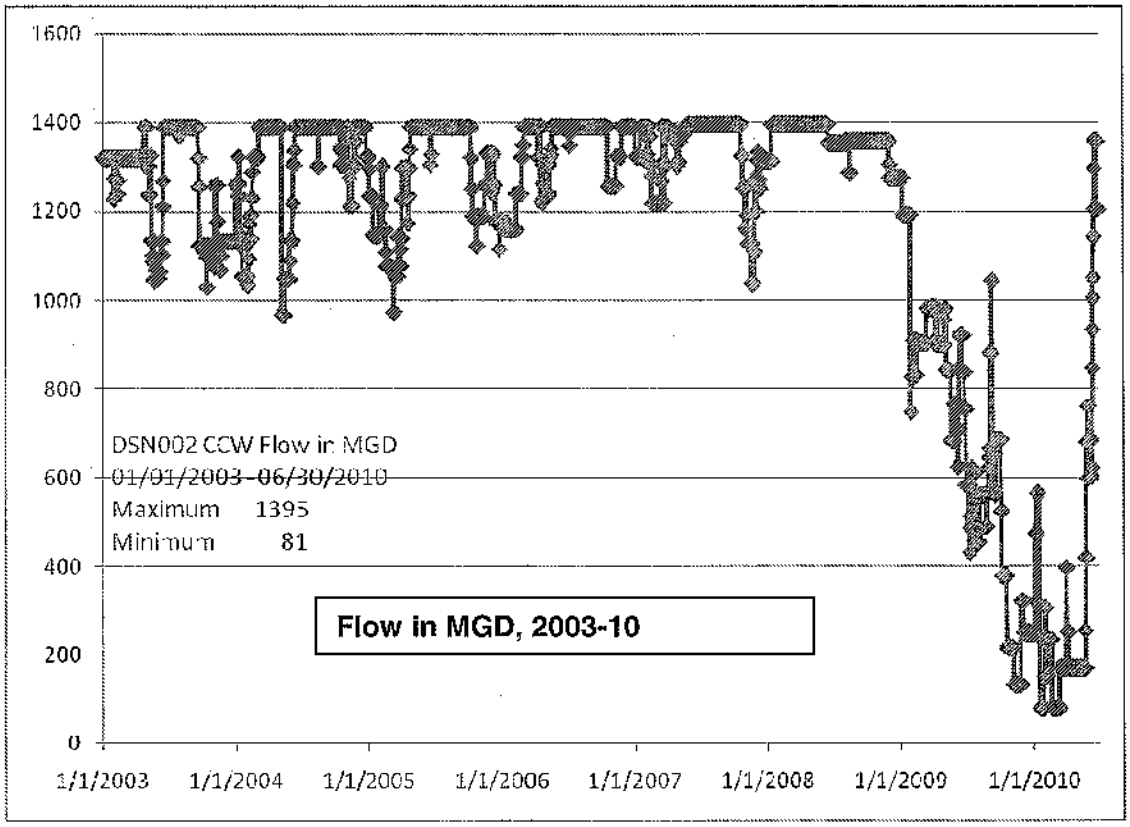


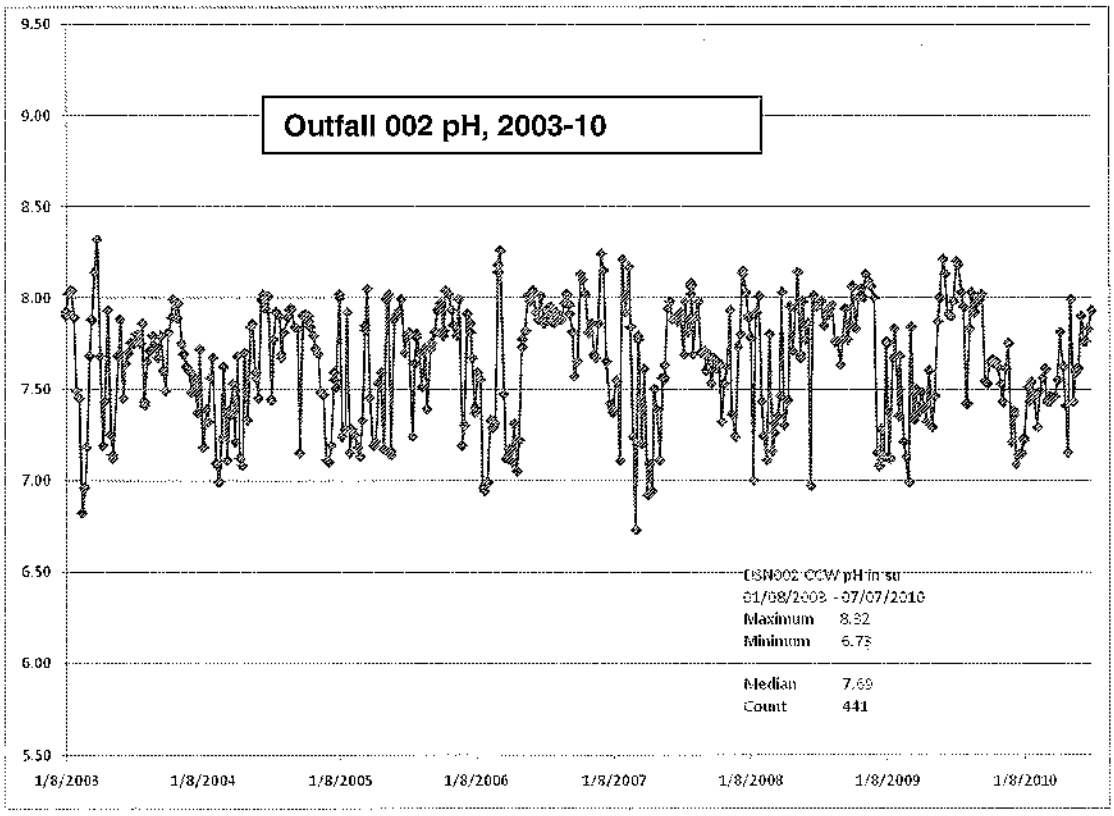
Outfall 001 – Oil & Grease, mg/l, 2003 - 10



APPENDIX 4

HISTORICAL MONITORING AND INSPECTION - Outfall 002





APPENDIX 5a

WATER QUALITY BASED EFFLUENT CALCULATIONS

The following formulas are used to evaluate water quality protection:

$$Cm = \frac{QsCs + QwCw}{Qs + Qw}$$

where:

Cm = resulting in-stream concentration after mixing
Cw = concentration of pollutant in wastewater
Cs = stream background concentration
Qw = wastewater flow
Qs = stream low flow

to protect water quality:

$$Cw \leq \frac{(S_A)\,[Cm\,(Qs + Qw) - QsCs]}{Qw}$$

where (S_A) is the percent "Stream Allocation".

Calculations for this permit have been done using a standardized worksheet titled "Water Quality Based Effluent Calculations." Appendix 4 provides Division policy and procedures in establishing these permit limits:

1. The critical low flow values are determined using USGS data:

Fish and Aquatic Life Protection
7Q10 - Low flow under natural conditions
1Q10 - Regulated low flow conditions

Other than Fish and Aquatic Life Protection
30Q2 - Low flow under natural conditions

2. Fish & Aquatic Life water quality criteria for certain Metals are developed through application of hardness dependent equations. These criteria are combined with dissolved fraction methodologies in order to formulate the final effluent concentrations.

3. For criteria that are hardness dependent, chronic and acute concentrations are based on a Hardness of 50 mg/L and Total Suspended Solids (TSS) of 10 mg/L unless STORET or Water Supply intake data substantiate a different value. Minimum and maximum limits on the hardness value used for water quality calculations are 25 mg/L and 400 mg/L respectively.

4. Background concentrations are determined from the division data base, results of sampling obtained from the permittee, and/or obtained from nearby stream sampling data. If this background data is not sufficient, one-half of the chronic "In-stream Allowable" water quality criteria for fish and aquatic life is used. If the measured background concentration is greater than the chronic "In-stream Allowable" water quality criteria, then the measured background concentration is replaced with the chronic "In-stream Allowable" water quality criteria for the

purpose of calculating the appropriate effluent limitation (Cw). Under these circumstances, and in the event the "stream allocation" is less than 100%, the calculated chronic effluent limitation for fish and aquatic life should be equal to the chronic "In-stream Allowable" water quality criteria. These guidelines should be strictly followed where the industrial source water is not the receiving stream. Where the industrial source water is the receiving stream, and the measured background concentration is greater than the chronic "In-stream Allowable" water quality criteria, consideration may be given as to the degree to which the permittee should be required to meet the requirements of the water quality criteria in view of the nature and characteristics of the receiving stream.

Each worksheet has fourteen (14) data columns, all of which may not be applicable to any particular characteristic constituent of the discharge. A description of each column is as follows:

Column 1: The "Stream Background" concentrations of the effluent characteristics.

Column 2: The "Chronic" Fish and Aquatic Life Water Quality Criteria. For Cadmium, Copper, Lead, Nickel, and Zinc, this value represents the criteria for the dissolved form at laboratory conditions. The Criteria Continuous Concentration (CCC) is calculated using the equation:

$$CCC = (\exp \{ m_C [\ln (\text{stream hardness})] + b_C \}) (CCF)$$

CCF = Chronic Conversion Factor

This equation and the appropriate coefficients for each metal are from Tennessee Rule 1200-4-3-.03 and the EPA guidance contained *in The Metals Translator: Guidance For Calculating A Total Recoverable Permit Limit From a Dissolved Criterion* (EPA 823-B-96-007, June 1996). Values for other metals are in the total form and are not hardness dependent; no chronic criteria exists for silver. Published criteria are used for non-metal parameters.

Column 3: The "Acute" Fish and Aquatic Life Water Quality Criteria. For Cadmium, Copper, Lead, Nickel, Silver, and Zinc, this value represents the criteria for the dissolved form at laboratory conditions. The Criteria Maximum Concentration (CMC) is calculated using the equation:

$$CMC = (\exp \{ m_A [\ln (\text{stream hardness})] + b_A \}) (ACF)$$

ACF = Acute Conversion Factor

This equation and the appropriate coefficients for each metal are from Tennessee Rule 1200-4-3-.03 and the EPA guidance contained in *The Metals Translator: Guidance For Calculating A Total Recoverable Permit Limit From a Dissolved Criterion* (EPA 823-B-96-007, June 1996). Values for other metals are in the total form and are not hardness dependent; no acute criteria exists for Total Chromium. Published criteria are used for non-metal parameters.

Column 4: The "Translator" converts the value for dissolved metal at laboratory conditions (columns 2 & 3) to total recoverable metal at in-stream ambient conditions (columns 5 & 6). This factor is calculated using the linear partition coefficients found in *The Metals Translator: Guidance For Calculating A Total Recoverable Permit Limit From a Dissolved Criterion* (EPA 823-B-96-007, June 1996) and the equation:

$$\frac{C_{diss}}{C_{total}} = \frac{1}{1 + \{ [K_{po}] [ss^{(1+a)}] [10^{-6}] \}}$$

ss = in-stream suspended solids concentration [mg/l]

Linear partition coefficients for streams are used for unregulated (7Q10) receiving waters, and linear partition coefficients for lakes are used for regulated (1Q10) receiving waters. For those parameters not in the dissolved form in columns 2 & 3 (and all non-metal parameters), a Translator of 1 is used.

Column 5: The "Chronic" Fish and Aquatic Life Water Quality Criteria at in-stream ambient conditions. This criteria is calculated by dividing the value in column 2 by the value in column 4.

Column 6: The "Acute" Fish and Aquatic Life Water Quality Criteria at in-stream ambient conditions. This criteria is calculated by dividing the value in column 3 by the value in column 4.

Column 7: The "Chronic" Calculated Effluent Concentration for the protection of fish and aquatic life. This is the Chronic limit.

Column 8: The "Acute" Calculated Effluent Concentration for the protection of fish and aquatic life. This is the Acute limit.

Column 9: The In-Stream Water Quality Criteria for the protection of Human Health associated with the stream use classification of Organism Consumption (Recreation).

Column 10: The In-Stream Water Quality Criteria for the protection of Human Health associated with the stream use classification of Water and Organism Consumption. These criteria are only to be applied when the stream use classification for the receiving stream includes both "Recreation" and "Domestic Water Supply."

Column 11: The In-Stream Water Quality Criteria for the protection of Human Health associated with the stream use classification of Domestic Water Supply.

Column 12: The Calculated Effluent Concentration associated with Organism Consumption.

Column 13: The Calculated Effluent Concentration associated with Water and Organism Consumption.

Column 14: The Calculated Effluent Concentration associated with Domestic Water Supply.

NOTE: The calculated chronic water quality effluent concentrations from Column 7 should be compared, individually, to the values calculated in Columns 12, 13, and 14 in order to determine the most stringent chronic permit limitations. The calculated acute water quality effluent concentrations from Column 8 should then be compared, individually, to values equal to two (2) times the values presented in Columns 12, 13, and 14 in order to determine the most stringent acute permit limitations. These water quality based limits should then be compared to any technology based (CFR or Tennessee "Rules") effluent limitations, and/or any previous permit limitations, for final determination of the permit limits.

APPENDIX 5b

Calculation of Flow Weighted Concentrations for TSS and O&G – Outfall 001

Calculation of Flow Weighted Concentrations
TVA - Kingston Fossil Plant - TN0005452
Outfall 001

	Flow	Monthly Average		Daily Maximum	
		Allowable Concentration	Allowable Mass	Allowable Concentration	Allowable Mass
Effluent Source	**[MGD]**	**[mg/l]**	**[lb/day]**	**[mg/l]**	**[lb/day]**
TSS					
Low Volume Wastes	7.43	30.0	1858.99	100.0	6196.62
Ash Transport Water	24.029	30.0	6012.06	100.0	20040.19
Metal Cleaning Wastewater	0.007	30.0	1.75	100.0	5.84
Coal Pile Runoff	0.11	--	--	50.0	45.87
Total	**31.58**	**29.9**	**7872.79**	**99.8**	**26288.51**
Oil & Grease					
Low Volume Wastes	7.43	15.0	929.49	20.0	1239.32
Ash Transport Water	24.029	15.0	3006.03	20.0	4008.04
Metal Cleaning Wastewater	0.007	15.0	0.88	20.0	1.17
Coal Pile Runoff	0.11	--	--	--	--
Total	**31.576**	**14.9**	**3936.40**	**19.9**	**5248.53**

APPENDIX 5c

Water Quality Based Effluent Calculations – Outfall 002

WATER QUALITY BASED EFFLUENT CALCULATIONS
OUTFALL 002

FACILITY: TVA Kingston Fossil Plant
PERMIT #: TN0005452

Stream (1Q10)	Stream (30Q2)	Waste Flow *	Ttl. Susp. Solids	Hardness (as CaCO3)	Stream Allocation
[MGD]	[MGD]	[MGD]	[mg/l]	[mg/l]	[%]
467	NA	187	10	50	100

	1	2	3	4	5	6	7	8
	Stream	Fish/Aqua. Life		Effluent	Fish & Aquatic Life Water Quality Criteria (1Q10)			
	Bckgrnd.	Water Quality Criteria		Fraction	In-Stream Allowable		Calc. Effluent Concentration	
EFFLUENT	Conc.	Chronic	Acute	Dissolved	Chronic	Acute	Chronic	Acute
CHARACTERISTIC	[ug/l]	[ug/l]	[ug/l]	[Fraction]	[ug/l]	[ug/l]	[ug/l]	[ug/l]
Chlorine (T. Res.)	0.000	11.000	19.000	1.000	11.000	19.000	38.5	66.4

	9	10	11	12	13	14
	Human Health Water Quality Criteria (30Q2)					
	In-Stream Criteria			Calc. Effluent Concentration		
EFFLUENT	Organisms	Water/Organism	DWS	Organisms	Water/Organism	DWS
CHARACTERISTIC	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[ug/l]
Chlorine (T. Res.)	NA	NA	NA	NA	NA	NA

* This flow was used for purposes of using a a dilution factor of (654-187) to 187, or 3.5 to 1. In light of the recirculating flow conditions which this facility was designed to operate under, and the fact that the estimated low flow conditions in-stream of 155.8 MGD are substantially lower than the 654 MGD necessary to maintain minimum operating conditions, the division has decided to forego any attempts to reconcile the low flow conditions of the receiving stream with the minimum water volume necessary to sustain the operations at the facility. For this reason, the division is assuming that during periods when the facility is operating during minimum capacity, and under low flow conditions, the volume of water necessary to continue operations in a recirculating system is equal to 654 MGD. Furthermore, since only 187 MGD, or one (1) unit, will be allowed to be chlorinated at one time, a dilution factor of (654-187) to 187, or 3.5 to 1, will be used in determining the total residual oxidant concentration allowable in the discharge from Outfall 002.

NOTE: Water Quality criteria for stream use classifications other than Fish & Aquatic Life are based on the 30Q2 flow.

APPENDIX 6

NEW PERMIT LIMITS AND MONITORING REQUIREMENTS

Outfall 001

PERMIT LIMITS

OUTFALL 001

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY			
	AVG. CONC. (mg/l)	AVG. AMNT. (lb/day)	MAX. CONC. (mg/l)	MAX. AMNT (lb/day)	MSRMNT. FRQNCY.	SAMPLE TYPE
FLOW	Report (MGD) *		Report (MGD) *		1/Week	Instantaneous
pH **	Range 6.0 - 9.0				1/Week	Grab
OIL & GREASE	12.0	--	16.0	--	1/Month	Grab
TOTAL SUSPENDED SOLIDS (TSS)	26.0	--	84.0	--	1/Month	Grab
NITROGEN, AMMONIA TOTAL (Plant Intake)	--	--	Report	Report	1/Month	Grab
NITROGEN, AMMONIA TOTAL (Effluent)	--	--	Report	Report	1/Month	Grab
NITROGEN, AMMONIA TOTAL (Net Discharge)	--	--	Report ****	Report	1/Month	Calculated
ALUMINUM, TOTAL	--	--	Report	--	1/Month	Grab
ANTIMONY, TOTAL	--	--	Report	--	1/Month	Grab
ARSENIC, TOTAL	--	--	Report	--	1/Month	Grab
BARIUM, TOTAL	--	--	Report	--	1/Month	Grab
BERYLLIUM, TOTAL	--	--	Report	--	1/Month	Grab
CADMIUM, TOTAL	--	--	Report	--	1/Month	Grab
CHROMIUM, TOTAL	--	--	Report	--	1/Month	Grab
COPPER,TOTAL	--	--	Report	--	1/Month	Grab
IRON,TOTAL	--	--	Report	--	1/Month	Grab
LEAD, TOTAL	--	--	Report	--	1/Month	Grab
MERCURY, TOTAL	--	--	Report	--	1/Month	Grab
NICKEL, TOTAL	--	--	Report	--	1/Month	Grab
SELENIUM, TOTAL	--	--	Report	--	1/Month	Grab
SILVER, TOTAL	--	--	Report	--	1/Month	Grab
THALLIUM, TOTAL	--	--	Report	--	1/Month	Grab
ZINC, TOTAL	--	--	Report	--	1/Month	Grab
CYANIDE, TOTAL	--	--	Report	--	1/Month	Grab
IC25	Report (serial dilutions)				Once/permit	Grab ***

Note: The permittee shall take reasonable steps to prevent discharge of cenospheres other than in trace amounts from the outfall.

* Flow shall be reported in Million Gallons per Day (MGD).

** pH analyses shall be performed within fifteen (15) minutes of sample collection.

*** See Part III for methodology.

**** If a calculated value for net addition of ammonia as nitrogen exceeds an action concentration value of 1.0 mg/L, the permittee should investigate source(s) of ammonia, and proceed with a corrective action(s), if necessary. Furthermore, Knoxville EFO shall be notified within 24 hours from the time the permittee receives results indicating that an action value of 1.0 mg/L was exceeded

APPENDIX 6

Outfall 002

PERMIT LIMITS

OUTFALL 002

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY			
	AVG. CONC. (mg/l)	AVG. AMNT. (lb/day)	MAX. CONC. (mg/l)	MAX. AMNT. (lb/day)	MSRMNT. FRQNCY.	SAMPLE TYPE
FLOW	Report (MGD) [1]		Report (MGD) [1]		Daily	Pump logs
pH [2]	Range 6.0 to 9.0				1/Week	Grab
TEMPERATURE, Intake	--		Report		Continuous [3]	Recorder
TEMPERATURE, Effluent	--		36.1°C (97.0°F)		Daily	Calculate [3]
TOTAL RESIDUAL OXIDANT (reported as chlorine) [4]	0.038	--	0.066	--	1/Week	Grab [6]
TOTAL RESIDUAL OXIDANT (reported as chlorine) [5]	0.011	--	0.019	--	1/Week	Grab [6]
TIME OF OXIDANT ADDITION (minutes/day/unit)	--		120 [7]		1/Day	Log Records
IC25	Survival, Reproduction, & Growth in 100% Effluent				See note 8	Composite [8]

1 Flow shall be reported in Million Gallons per Day (MGD).
2 pH analyses shall be performed within fifteen (15) minutes of sample collection.
3 Intake temperature is measured hourly (continuously) but reported as a daily average once per day. The daily average discharge temperature shall be calculated for the cooling channel based on the 24-hour average intake temperature, 24-hour average unit load, and the 24-hour average flow through Outfall 002.
4 The limits depicted are applicable at flows of 654 MGD, and above, from Outfall 002. Only one (1) unit, with a flow rate of 187 MGD is allowed to be chlorinated at one time.
5 The limits depicted are applicable at flows less than 654 MGD, in lieu of the limits shown in footnote 4.
6 Flow weighted maximum shall be calculated from instantaneous measurements of the chlorinated discharges from a unit and adjusted for flow from the non-chlorinated units contributing to the discharge. The calculated flow-weighted maximum will be used for determination of compliance with the daily maximum limitation. Except for periods of macroinvertebrate control when oxidant addition is required (see Permit - Part III), samples shall be taken once at the beginning of the period of chlorination for one unit and once every 15 minutes thereafter. At the end of the period of chlorination for that unit, one sample shall be taken. Sampling for these oxidants is not required when there is no chlorine/bromine added during that day. TRC analyses shall be performed within fifteen (15) minutes of sample collection.
7 Application of a oxidant (bromine/chlorine) beyond the 120 minutes per day will be allowed to facilitate nuisance macroinvertebrate control according to the Plan for such activities described in Permit - Part III.
8 See Part III for sampling requirements and monitoring frequency of toxicity tests.

APPENDIX 6

Internal Monitoring Point 02A

PERMIT LIMITS

OUTFALL 02A

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
	MONTHLY		DAILY			
	AVG. CONC. (mg/l)	AVG. AMNT. (lb/day)	MAX. CONC. (mg/l)	MAX. AMNT. (lb/day)	MSRMNT. FRQNCY.	SAMPLE TYPE***
FLOW	Report (MGD) *		Report (MGD) *		1/Week	Calculated
pH**	Range 6.0 - 9.0				1/Week	Grab
TOTAL SUSPENDED SOLIDS (TSS)	30	--	100	--	1/Week	Grab
OIL & GREASE	15	--	20	--	1/Week	Grab
TOTAL MERCURY	Report	--	Report	--	Quarterly	Grab
METHYL MERCURY	Report	--	Report	--	Quarterly	Grab
ARSENIC	Report	--	Report	--	Monthly	Grab
CADMIUM	Report	--	Report	--	Monthly	Grab
COPPER	Report	--	Report	--	Monthly	Grab
LEAD	Report	--	Report	--	Monthly	Grab
NICKEL	Report	--	Report	--	Monthly	Grab
SELENIUM	Report	--	Report	--	Monthly	Grab
THALLIUM	Report	--	Report	--	Monthly	Grab
ZINC	Report	--	Report	--	Monthly	Grab

* Flow shall be reported in Million Gallons per Day (MGD).
** pH analyses shall be performed within fifteen (15) minutes of sample collection.
*** Grab samples will be used at the time of pumped discharge from the detention pond.